THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XI. No. 265—14th YEAR.] LONDON, DECEMBER 16, 1862. [Subscription { 15s. in Advance / 18s Credit.] DOUBLE No. Price 1s.

CANNEL COAL.

RAMSAY'S NEWCASTLE CANNEL has become the principal Cannel Coal used in the Metropolis. Its joint products of gas of high illuminating power, and coke of good quality, make it one of the most economical coals known. The Crystal Palace was lighted from it in 1851, and the Post-office, and *Times* Office, are at present.

FIRE-CLAY RETORTS and PIPES.

FIRE-BRICKS (marked "RAMSAY") OF ALL DESCRIPTIONS.

G. H. RAMSAY, Broad-chare, Newcastle-on-Tyne. Manufactory established in 1804.

TO GAS MANUFACTURERS, METER MAKERS, AND OTHERS.

THE Advertiser, having constructed a Mechanical, Cylindrical, Diaphragmless, DRY GAS-METER, is anxious to meet with assistance, as Partners or otherwise, from any of the above.

For further particulars, apply by letter to W. W. H., 120, Widemarsh Street, HEREFORD.

SECOND-HAND Station-Meter WANTED, capable of passing 7000 cubic feet per hour, with Bye-pass, Clock, and Tell-tale.

Price and particulars to be sent to Mr. RUSSELL, Gas-Works, UXBRIDGE.

TO CONTRACTORS AND OTHERS.

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THE Directors of the Hastings and ST. LEONARD'S GAS COMPANY are desirous of receiving TENDERS for laying about 2450 yards of SOCKET-PIPES of from 15 ins. to 24 ins. diameter.

The Specification may be seen at the Offices of the above Company on and after the 19th inst., and Tenders must be delivered on or before the 31st inst.

A. H. WOOD, General Manager.

Gas Company's Offices, Hastings, Dec. 12, 1862.

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WANTED, the Management of a Work by a Man aged 33. Practically acquainted with the manufacture of Gas, Mains, Services, Meters, and Interior Fittings. Can keep accounts. Good references. A moderate salary.

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MR. G. W. STEVENSON, C.E., F.G.S., Borough Engineer of Halifax, offers his services to Corporations and Companies upon all business connected with public lighting, gas-works, water-works, or town sewerage. He may be consulted either at HALIFAX, or at 26, Parliament Street, WESTMINSTER.

COWEN'S PATENT FIRE-CLAY RETORTS.

JOSEPH COWEN and CO.,

BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,

Were the only parties to whom a PRIZE MEDAL wa awarded at the GREAT EXHIBITION of 1851, for "GAS RETORTS and OTHER OBJECTS in FIRE-CLAY," and they have also been awarded in the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

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Coal Office, QUAY SIDE, NEWCASTLE-ON-TYNE.

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ALMA WORKS,

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and 69, UPPER THAMES STREET, LONDON, Original Manufacturers of Wrought-Iron Gas Tubes and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam Boilers.

J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest Orders may be executed in a few days.

Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanised Tubes, &c.

N.B. All Goods thoroughly Tested before sent out, and Warranted.

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STATION-METER for Sale.—An excellent Station-Meter (by Cochrane, of Edinburgh), with Square Cast-Iron Case, 8 feet × 8 feet × 6 feet 8 in. high, with 10-in. inlet, outlet, by-pass Valves, Clock, and Tell-tale complete. Will pass about 350,000 cubic feet per day; is in good order, and is parted with to make way for one of a larger size.

For terms, apply to the Subscriber, JOHN Z. KAY, Engineer, Dundee Gaslight Company.

Dundee, Nov. 25, 1862.

BLAYDON BURN AND LOW BENWELL FIRE CLAY RETORT AND FIRE-BRICK WORKS, NEAR NEWCASTLE-ON-TYNE.

WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the Manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other Articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.

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TO be Sold Cheap, a Gas Governor, in good condition, with 4½ inches Inlet and Outlet. Parted with to make way for a larger one.

Apply to G. JEFFS, Gas Company, STAMFORD.

WANTED, a Situation to Inspect, Repair, or Re-construct Meters, Wet or Dry. Is acquainted with Fittings, and the general work of a Gas-Work. Unexceptionable testimonials.

Address, A. B., No. 1, Great Queen Street, Westminster, LONDON.

A Gentleman, aged 33, who has had considerable experience in the formation and working of Gas Companies, is desirous of obtaining a Situation either as ENGINEER, or MANAGER and SECRETARY combined. Would have no objections to go abroad to erect a Work, with a view of taking the management upon its completion, either at a fixed salary or a partial one, with further remuneration according to the profits made.

Address, A. B., 1, Spencer Villas, Grange Road, Canonbury, LONDON, N.

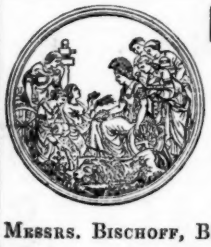
BOILERS

FOR SALE, by Private Contract, at the Sunderland and South Shields Water-Works Station, Cleadon, six High-Pressure CYLINDRICAL BOILERS, from 26½ ft. to 31 ft. long, and from 5 to 6 ft. diameter, with all the Fittings complete.

The above are in good condition, having been used in Sinking the Shaft at the Cleadon Water-Works, which is now completed.

The same may be seen at the above Works, and further particulars obtained on application to Mr. WILLIAM DIXON, at the Offices, 7, Fawcett Street, SUNDERLAND.

C. L. DESMEDT and CO., at Brussels, Belgium, wish to buy DRY COAL-TAR PITCH. Tenders for Parties or Contracts will be immediately answered.

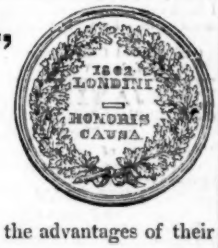


BISCHOFF, BROWN, & CO.,

LANGHAM WORKS,

GEORGE STREET, GREAT PORTLAND STREET,

LONDON, W.



MESSRS. BISCHOFF, BROWN, & Co. beg to draw the attention of the Managers of Gas Companies to the advantages of their

PATENT WET GAS-METER,

Which has been proved at the Exhibition to overcome all the objections hitherto raised, both to the Wet and the Dry Meter and for which

A PRIZE MEDAL

Was awarded, as being "Self-Adjusting, with very little Friction."

In ordinary situations, this Meter will not require any attention or re-charging with water for from twelve to eighteen months, during the whole of which time, and under all circumstances, it maintains a CORRECT REGISTRATION.

It is now used by most of the London and many Provincial Gas Companies, besides in the principal Towns on the Continent.

Price-Lists, and Tenders for Meters or any Experimental Apparatus connected with Gas Lighting, forwarded on application.

Persons desirous of Agencies are requested to apply, with References.

JOURNAL OF GAS LIGHTING ONE PENNY

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A New, Revised, and Extended Edition of
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Price—1000 copies, £3. 3s.; 500 copies, £1. 15s.; any smaller number at 7s. 6d. per 100.

These little books are intended for gratuitous distribution by gas companies. More than **200,000** copies have been circulated, exclusively of those in several Continental languages. The demand for them continues, and the author is thankful for the numerous assurances he receives that his publications have done good; making known the benefits, and thereby extending the uses, of gas.
Black Rock, Brighton, August, 1862.

PARKER, SON, and BOURN, West Strand, LONDON.

TO Mr. BENJAMIN WHITEHOUSE, GASHOLDER WORKS, WEST BROMWICH
Sir,—I have much pleasure in saying the 110-feet Gasholder, with Columns and Framing, recently erected by you for this Company has been tested, and gives myself and the Directors great satisfaction; if possible, I think this Gasholder is the best of the three you have made for us.—I am, Sir, yours truly,
H. BOWEN, Engineer.
Gaslight and Coke Company,
Cardiff, March 13, 1863.

BENJAMIN GIBBONS, Jun., DEEPDALE FIRE-CLAY & BRICK WORKS,
Near DUDLEY,
Manufacturer of every description of Fire-Bricks, Lumps, Quarries, Shields, Flue Covers, &c., to any size or shape required.
FIRE-CLAY RETORTS,
TO MODEL OR DRAWING.
B. G. begs to call the attention of Gas Companies to his Fire-Clay Retorts, which have been used with great satisfaction in some of the largest Gas-Works in the Metropolis and many Provincial Towns in England.
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24 WHARF, HARROW ROAD, PADDINGTON, W.
Every article manufactured at their own Works and Mines, Brierley Hill.
FIRE-BRICKS, Lumps, Squares, Tiles, and Gas Retorts of all dimensions.
CRUCIBLE and CEMENT CLAYS.
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Shipments on the shortest notice.

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Estimates and Designs for Lighting and Ventilating Theatres, Concert-Rooms, Public and Private Buildings, can be had upon application at the above Address. Three light Crystal Chandeliers for Gas, commencing from 50s. and upwards.
Registered Designs of Crystal Chandeliers, for Gas or Candle, always on Show.
Inventors of the PATENT GAS-REGULATOR AND PURIFIER.
A Large Assortment of Gas Moons, Chimneys, and Reflectors, of every description, always on hand.

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PORTABLE STEAM BOILERS,
On WHEELS. Constructed expressly for Gas-Works, for cleansing the pipes and apparatus of accumulations of Napthaline, Congealed Tar, &c.; Thawing Gasholder Tanks, and the Frozen Water Lutes of Telescopic Gasholders, Working Steam Engines, &c. They are used in London at the
IMPERIAL GAS-WORKS,
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EQUITABLE GAS-WORKS,
SOUTH METROPOLITAN.
ALSO AT

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BIRMINGHAM,	BRADFORD,	AMSTERDAM,
WORCESTER,	KEYNSHAM,	YSTADT,
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No Gas Company should be without One, the entire cost being often Saved in One Winter.
MIDLAND GASHOLDER AND BOILER WORKS,
DONNINGTON, NEWPORT, SHROPSHIRE.
Office: Little Sutton Street, London, E.C.

F. & C. OSLER,
45, OXFORD STREET, LONDON;
Manufactory—Broad Street, Birmingham—Established 1807,
MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.
ELEGANT CRYSTAL GLASS CHANDELIERS, for GAS, from £4 upwards (Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. The more extensive use of GAS in private dwellings has induced Messrs. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.
THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE ON THE LOWEST TERMS.

THE ALPHA TUBE WORKS,
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LAMBERT, BROTHERS,
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WROUGHT-IRON TUBES AND FITTINGS,
For Gas and High-pressure Water and Steam.

WALKERS GAS-VALVES
HAVE BEEN
DURING THE PAST TWENTY-FIVE YEARS,
USED IN UPWARDS OF
450 BRITISH and FOREIGN GAS-WORKS.
They are made in the most SOLID, SUBSTANTIAL manner, with PLANED and SURFACED JOINTS, and SCRAPED SURFACES. They have a CLEAR, FULL BORE, in a STRAIGHT LINE of PIPE, and are TIGHT to PERFECTION. All crooked tortuous passages causing heavy back pressures in driving through them are avoided.
Engineers are requested to insert "Valves of Walkers Manufacture" in their Specifications, by which they will be absolutely certain of the above important advantages. They can name the construction of Valve they prefer best, as Walkers make them of every description—either Walkers SCREW-VALVES, for the Gas-Works or for Street-Mains; INTERNAL RACK-VALVES; or the ORDINARY RACK and PINION-VALVES. REGULATING-VALVES, with INDICATING COLUMNS, &c.
Walkers London Manufactory is devoted entirely to the above class of work, of which their make is nearly double that of any other British house.
Drawings and Prices on Application.
LITTLE SUTTON STREET, LONDON, E.C.

NO CHIMNEY WANTED

FOR RICKETS & HAMMOND'S PATENT CALORIFERE GAS-STOVES, in Churches, Halls, or Shops; and for Conservatories, or any close apartment, a Pipe can be attached to carry away the burnt air.

AGAR STREET, STRAND, LONDON.—DISCOUNT TO THE TRADE.

REDUCED PRICES OF

BRYAN DONKIN & CO.

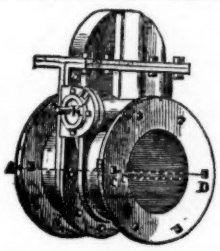
IMPROVED GAS VALVES

from 2 inches to 18 inches, price 9s. 6d. to 12s. per inch diameter

List of prices, with full dimensions of all sizes up to 30 inches, to be had on application.

These Valves are all proved to 30 lbs. on the square inch before leaving the works, and are always kept in stock.

Valves made with Outside Racks to order. Also, Screw Water-Valves with Gun-Metal Faces.



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NEAR GRANGE ROAD, BERMONDSEY.

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PADDON and FORD,

GAS-METER AND APPARATUS WORKS,

GRAY'S INN ROAD, LONDON.

MANUFACTURER OF WET AND DRY GAS-METERS, STATION-METERS, GOVERNORS, &c. &c.

A large number of **STATION-METERS,** up to 80,000 feet per hour (being by far the largest in use), and **GOVERNORS** for **MAINS,** up to 24 inches, have been constructed by Paddon and Ford. These Meters and Governors possess peculiar advantages as regards strength and freedom of action.

Sole Manufacturer of **PADDON'S PATENT STREET-LAMP REGULATORS,** for insuring any required consumption. These Regulators are in general and increasing use, and references can be given to Gas Companies who use them for every Lamp.

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ESTABLISHED **1840.**

JOHN EUNSON AND SON,

GAS ENGINEERS, AND MANUFACTURERS OF CLAY RETORTS,

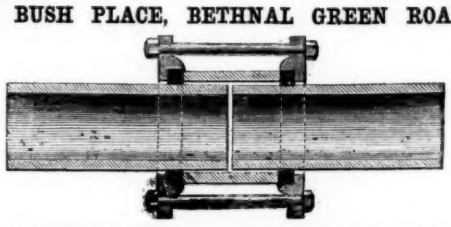
AND FIRE GOODS IN GENERAL,

WOLVERHAMPTON.

Retort Mouthpieces, Bolts, Nuts, and every description of Wrought-Iron Work.

DR. NORMANDY'S
PATENT PIPE-JOINTS.

HOLLY BUSH PLACE, BETHNAL GREEN ROAD, N.E.



The advantages which these Joints offer are economy, perfect soundness and durability, ease and rapidity of application, use of perfectly plain pipes, without sockets, screws, or projections of any kind, so that a tight Joint may be made, even though the ends of the pipes to be united do not come close together. Any ordinary labourer is capable of securely fixing them.

These Joints are particularly applicable to gas, water, and suction-pipes, the Joints remaining permanently sound; they are cheaper than the socket and spigot at present in use for gas and water-pipes, inasmuch as they save the lead, the gasket, the iron forming the socket (which, for example, in a 3-inch main amounts to 10 lbs.), and the fire necessary for melting the lead; a considerable saving is also effected in the time of making the Joint, more than four Joints being completed in the time required to make only one of the others.

By unscrewing two bolts, a pipe can instantly be taken up or removed, and another substituted for it with the greatest facility.

By means of these Joints, pipes made of either wrought or cast-iron, copper, lead, tin, earthenware, glass, paper, bitumen, gutta-percha, suction-hose, and, in fact, any material of which pipes or tubes can be manufactured, may be rapidly and soundly united, and taken apart with extreme facility.

They are made of all sizes, so as to suit pipes ⅛ of an inch external diameter and upwards.

ROBERT MACLAREN and CO.,

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Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

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Proprietors of best Glass-house Pot and Crucible Clay; Manufacturers of Glass-house Pots, Crucibles, Gas-Retorts, and Fire-Bricks of every description.

WHITEHOUSE and CO., Boiler and GASHOLDER MAKERS,

GLOBE PATENT TUBE WORKS,

WEDNESBURY,

Beg to draw the attention of Engineers and Managers of Gas Works to the superior quality of the Article they manufacture, both in respect of the iron employed, and the perfect manner in which it is welded; in proof of which they can refer to the testimonials of the most eminent Gas Engineers, and the experience of the principal of the large Gas Companies of the kingdom.

Orders promptly executed.

BELGIAN CLAY RETORTS.

ALBERT KELLER, Ghent.—The

removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Albert Keller, of Ghent, begs to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by him. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications, addressed to ALBERT KELLER, GHENT, will receive immediate attention.

LEONI'S Patent Adamas

GAS-BURNERS are entirely free from liability to Corrosion, Injury from Heat, or danger of Fraction, and are *unalterable* in the dimensions of their Apertures. Uniformity in the consumption of gas is obtained by the process of manufacture, which insures that the burners shall be precisely similar in pattern.

Net Cash Price, 8s. per gross.

For COUNTRY AGENCIES, apply to S. LEONI, 34, St. Paul Street, New North Road, LONDON, N.

WALTER MABON, Engineer,

ARDWICK IRON WORKS, FAIRFIELD STREET,

MANCHESTER,

Manufacturer of

IRON TANKS for Gasholders, Railway Stations, &c.

GASHOLDERS.—Extensive premises at Gorton, solely for the manufacture of Gasholders, and other heavy Wrought-Iron Structures.

GAS APPARATUS.—W. M. has an extensive assortment of patterns for Purifiers from 4 feet to 15 feet square, also round ones from 4 feet to 10 feet diameter; Scrubbers, Condensers, Washers, Columns, Girders, and Tripod Patterns, suitable for Gasholders, from 10 feet to 150 feet diameter, either Single-lift or Telescope. Contracts for Gas-Works of any Magnitude. Designs, Specifications, and Estimates furnished.

WROUGHT and CAST IRON ROOFS for Railway Stations, Gas Works, Warehouses, and Sheds, prepared for Slates or for Corrugated Iron.

IRON HOUSES, either for Dwellings, Manufactories, or Public Buildings.

PIPES and VALVES, for Gas and Water, from 2 inches to 48 inches bore.

GAS ENGINEERING OFFICES,

16, ADAM STREET, ADELPHI, W.C.

(Close to the Society of Arts.)

Mr. ANDERSON continues to Erect, or to supply the Drawings for his PATENT RETORT-SETTINGS. On this principle, three Ovens of Retorts are heated by one Coke and one Tar fire; and, for small Works, the principle is adapted to single Ovens in both cases, with a total absence of smoke, while the duration of the Retorts is from two to three years, and with great economy of fuel.

Mr. ANDERSON continues to supply his PATENT GAS-EXHAUSTER, together with Steam-Engines, &c., erected complete.

This is the most simple machine of the kind in use, being merely a double-action Pump, which any one can comprehend, and works for years without any repair.

Also, his PATENT FOUR-WAY VALVES. One of these valves does the work of three ordinary valves, when applied to Purifiers, Station-Meters, or other Gas Apparatus.

A workman cannot, by any possibility, make the mistake of shutting one passage without opening another; thus ensuring a constant flow of the gas.

All Racks, Pinions, Springs, and other delicate parts of ordinary valves, are in these valves abolished; the connecting-pipes are also much simplified, and the [illegible] reduced fully 30 per cent.

Also, his CONCENTRIC GOVERNOR, which [illegible]ds in half the space of the ordinary Governor, and [illegible]ulates the flow of Gas to the greatest nicety.

Mr. ANDERSON having five Gas-works on lease, besides being engineer to several others, has constant opportunities of perfecting his inventions before they are brought under public notice.

ANOTHER

MEDAL AWARDED BY THE JURY, INTERNATIONAL EXHIBITION,

1862,

To THOMAS GLOVER,

SUFFOLK STREET, CLERKENWELL GREEN, LONDON.

THOMAS GLOVER has great pleasure in informing Gas Companies and his other Patrons, that the *Jury of Class XXXI. of the International Exhibition of* 1862 have awarded, for his Patent Dry Gas-Meter, *a Prize Medal*. The reason given for this Award, in the Juries Official Report, is, "*For excellence of manufacture, as regards Dry Meters.*" See Official Report, p. 346.

It is worthy of remark, that the only two other Firms who receive Awards *both manufacture imitations of Thomas Glover's* Patent Dry Gas-Meter, and the reason given for these Awards is "*construction* and sound workmanship." Thomas Glover, therefore, claims that the *construction* of his Meter has obtained *three Awards from the Jury of the International Exhibition of* 1862; at the same time, *contrasting* the Award granted for his Meter by the words, "*For excellence of manufacture, as regards Dry-Meters.*"

The Prize Meter will be found in Class XXXI., No. 6301, connected with a 1-foot holder, to demonstrate that a 50-light Meter *measures and indicates accurately the small quantity of One Foot.*

WILLIAM PARKINSON AND CO.

(SUCCESSORS TO SAMUEL CROSLEY),

PATENT WET AND DRY GAS-METER MANUFACTURERS, &c.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

PATENT IMPROVED WET METER.

W. P. and Co. invite especial attention to this Meter, which entirely overcomes the difficulty to which ordinary Wet Meters are subjected, owing to the short range of the Float, which is necessary, in order to meet the requirements of the Sale of Gas Act.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

[*TUESDAY, DECEMBER* 16, 1862.

Notes upon Passing Events.

OUR Notes would be very incomplete without some words on the success of the Smithfield Club Show, in their new abode, as tenants under the Agricultural Hall Company—tenants, however, not paying, but receiving rent—a success which has surpassed the most sanguine expectations of the promoters of the undertaking. Within five days—the first being confined to a select few at 5s. each—nearly one hundred and forty thousand persons paid upwards of seven thousand pounds for admission, and this in a building which has only cost about forty thousand pounds. The Smithfield Cattle and Implement Show has long been a favourite December resort with that large London population which always seems ready to pay a shilling to be in a crowd; and it has also been, for many years, a reason for pilgrimages to the great city by the farmers and their friends, whom railroads every day induce to travel more. It cannot be believed that one-tenth of the people who flocked to Baker Street Bazaar, or the Agricultural Hall, know anything of, or care much about, the comparative merits of the long lines of live stock destined to be converted, on the closing of the show, into the fattest of beef, mutton, and pork; and, at the Baker Street Bazaar, the implement show, in later years, had to be taken on trust, so closely were the articles packed together. Perhaps, the secret lies in the fact that the tastes of the Londoner are, contrary to the Parisian, essentially bucolical—he likes to "affect the virtue" of rural tastes, although "he have it not," and that taste is pleasantly combined with the excitement of a crush. In the last seven years of the sixty-three during which the Smithfield Club has been in existence, the demand for space by agricultural implement-makers, who exhibited to take orders, and of the exhibitors of fat live stock, who thus either increased their reputation as breeders, or indulged in the luxury of a lottery for prizes, with a good sale besides, kept pace with the increasing taste of the general public for poking up snoring pigs; feeling, with sham-graziers airs, the rumps of bullocks; and turning the handles of chaff-cutting machines. At length, the attempt to exhibit machinery became a farce, the crowd squeezed respectable people out, and the cattle-salesmen and butchers complained not less than the breeders and feeders, that the fat animals before the show closed were all half poisoned by the foul air, and half of them hidden away in corners where they might be felt but could scarcely be seen. Hence arose a cry for more space, more air, and general accommodation, suited to the avowed condition of the agricultural interest. In the cry of complaint, the club was at first tolerably unanimous, but, when the present and only possible site of sufficient dimensions was favourably reported on by some forty members of the club, there arose a stubborn opposition, which is only referred to now as a warning against putting faith in names and neglecting evidence. The much-respected president of the club, the late Duke of Richmond, preserved a cold neutrality; his son, the present duke, was openly hostile to the change. Lord Portman, also an agricultural-minded nobleman, renowned for his sagacity, withdrew his name from the list of vice-presidents and trustees rather than be mixed up in so wild a scheme. With him resigned Sir John Shelley and Mr. Brandreth Gibbs, the honorary manager, and up to that period considered, with good reason, the governing power of the Smithfield Club. When all the details of the bargain between the Agricultural Hall Company and the Smithfield Club seemed settled, Sir John Shelley appeared to lead the anti-change party with a select band from the Royal Agricultural Society's council—Lord Tredegar, Mr. Thompson, M.P., then editor of the society's *Journal*, Mr. Brandreth, the brother of the honorary manager, Mr. Milward, of Thurgarton Abbey, a Nottinghamshire squire, one of the leading lights of the Royal Society, but best known in London as annual vendor of the fattest of corn and cake-fed ponies, Mr. Fisher Hobbs, famous for his breed of pigs and more than porcine powers of resistance, and others less known to agricultural farmers. Besides these personal votes, the radical, Sir John, declared that he had the sympathy and support of Lord Eversley a former, and Mr. Denison the present,

Speaker of the House of Commons, and, though last, not least, of the late Sir James Graham. It will certainly be asked by those who know the deference with which the "sons of the soil" treat great names, how the resistance of this phalanx of lords and landlords was resisted; for even the two or three noble friends of the Agricultural Hall scheme faltered, and hesitated before such a demonstration as that organized by the Westminster Radicals and Sussex landlords. The fact is, it was not resisted by the tenant farmers at all in public. They sent up their independent friends, and retired like heavy cavalry waiting for an opportunity. They were ready to find money, but not words. It was professor Liebig who indirectly enabled the Smithfield Club to remove from the narrow walls of the Baker Street Bazaar to the hall which is now the admiration of London. Professor Liebig, is a teacher of agricultural chemistry, and a party of farmers, salesmen, and butchers, have, without knowing it, been carrying out his principles of agricultural chemistry. The foundations of the Agricultural Hall Company were laid by the success of the Nitrophosphate Manure Company, which was established fifteen or sixteen years ago, by a few farmers, butchers, and cattle-salesmen, on the patent of an English chemist for utilizing the previously wasted blood of the London slaughterhouses. It is, consequently, best known as the Blood Manure Company. This manufacture has so flourished that its shareholders have long since received back their capital, and are now luxuriating in annual 10 per cent. dividends, with occasional bonuses. The late Jonas Webb, the greatest breeder in the world of downs and short horns, was chairman of this flourishing manure company, and, when he became chairman of the Agricultural Hall, brought many shareholders with him. To this interest was added all the strength of the implement manufacturers, who had long been justly dissatisfied with the narrow boundaries of the Baker Street Bazaar. The implement manufacturers and their friends paying nearly £1000 a year of subscriptions to the Smithfield Club, were able to organize a working majority in the contest, without calling on their farmer friends to vote; and thus it came to pass that the leading lights of the Royal Agricultural Society were snuffed out when they attempted to keep the Smithfield Club in a place which fat stock and manufacture had both outgrown.

When the last battle was fought and won, and Sir John Shelley retired beaten and disgusted, his friends consoled themselves by prophesying that the undertaking would be a failure—that neither aristocracy nor the mobocracy would ever find its way to the *terra incognita* of the cattle show when roofed in at Islington. A little later, when the farmers, the agricultural engineers, and cattle salesmen, had found an architect to carry out their ideas of what was required for a show of cattle and implements—and a design and plans were exhibited which looked extremely well on paper—the same notions of the fidelity of the London public consoled the "old party" of the Smithfield Club. Last week brought the theories of the Agricultural Hall reformers and the Smithfield Club Tories to the test of experience. It was then proved that Mr. Giblett, Mr. Jonas Webb, Mr. Garrett, Mr. Shuttleworth, and Mr. Howard, were right; and the Duke of Richmond, Lord Portman, Mr. Fisher Hobbs, and his friend, Sir John Shelley, were wrong. Not only have more than 140,000 people flocked to the building, and made the undertaking the success most respected at both ends of the town—a dividend success—but the hall is admitted by architects and engineers, men of taste and men of business, to be equally worthy of admiration for its proportions and for its suitability for the object for which it was designed. The fact is, that the directors knew what they wanted: not a college, nor a church, nor a temple; but a place for showing live stock to the best advantage on the ground-floor for crowds to see it, and implements in the galleries; and they confined their instructions to that object. The farmers laid down what conditions were essential for live stock; the agricultural engineers the conditions for displaying implements; and neither one nor the other preferred to spend the money of the shareholders in works of fine art, or poetry, or philanthropy. They had no electro-plate geniuses amongst them. The architect was young enough to follow the instructions he received, and clever enough to combine grandeur and grace with utility. When we remember what terrible failures most of the public buildings of London are, from Buckingham Palace to the National Gallery—from the combined design for the Exhibition of 1851, that was not carried out, to the barn that Fowke made at Kensington—the exhibitors at the Smithfield Club Show may, indeed, congratulate themselves that they were not dependent for a new lodging on the Government, which would have, no doubt, referred the matter to a commission of Royal Agricultural Society notabilities—such noble lords as Lords Portman and Tredegar; to experts such as Messrs. Thompson, Milward, and Fisher Hobbs—who would have reported against removal to any spot less desert and genteel than South Kensington. The shareholders may rejoice that plain farmers and experienced agricultural engineers conducted their affairs, and that their interests were not sacrificed to make the reputation of an extravagant artist.

The French, who are fond of claiming an absolute superiority in matters of taste, will find the design of the Agricultural Hall in every respect superior either to their International or their intended permanent Exhibition. In all public buildings, the great point is to know what you want, to plan the inside carefully, and then find an architect capable of putting a graceful or grand covering on your internal requirements. The reverse is the usual plan. The architect designs the outside, that many see and none use, and cares very little for the inside, which many use and few see, except in such an instance as a Cattle Show. It is estimated that, if the International Exhibition had been built on the same plan as the Agricultural Hall, at least £70,000 might have been saved, and a much more useful building produced.

In the execution of the Agricultural Hall—which has already secured the architect, Mr. Frederick Peek, of Maidstone, orders for designs for two public buildings of great importance—there has been no failure, no accident, and no miscalculation of any importance, except one, the amount of gas-light required. It was thought that about 1500 burners would be sufficient—4000 have not been found too many; and it will probably be found necessary to lower the seven 48-light star chandeliers which hang from the roof by at least a yard. The gas-fittings have been well executed, and with extraordinary despatch, by Messrs. Abercrombie and Son, of John Street, Tottenham Court Road. The following description of the building is taken from a contemporary:—

The site of land on which the hall is erected immediately faces Islington Green, extends westward to the Liverpool Road, and is within a few hundred yards of the Angel, at Islington. It has entrances from all sides. Its central position, as regards the various railway termini (with all of which it is in direct communication by means of the New Road), renders it well adapted for the purposes for which it is intended. The first stone was laid on the 5th of November, 1861. The western façade—that in the Liverpool Road—is the principal; and here there are two lofty towers and a bold carriage entrance. The construction is of yellow brick, with bands and arches of red bricks. At the eastern end, nearly facing Islington Green, is an archway of brickwork similar in character, with a covered way leading from it to the hall. The main hall, with a vaulted roof of iron and glass, is 384 feet in length, by 217 feet in breadth, in three spans: the span of the central portion of the glass roof, which is 76 feet in height, is about 125 feet. This hall is surrounded by galleries 36 feet in width, approached by five sets of double staircases, each 10 feet wide. There is also a minor hall 100 feet square. One thousand tons of iron are used in its construction, and the roofing contains 9 miles of iron sashbar, upwards of 1 acre of glass, and 2 acres of slating, whilst the space afforded by the galleries is considerably above an acre. The towers referred to are constructed with a view to assist ventilation. The iron pillars which support the central portions of the fabric form draining-tubes from the roof to the basement and the draining appliances beneath. A reservoir, capable of containing 5000 gallons of water, has been erected, with which hydrants are connected in various parts of the building, so that, in case of fire or any other requirement, they can be immediately made available.

Circular to Gas Companies.

The Commissioners of Sewers of the City of London have, we are glad to observe, become sensible of the ridicule to which the carrying out of the proposal to hang meters to the street-lamp-irons would expose them; and, if not deterred from committing such a monstrosity by the dictates of good taste, the dread of being objects for the pungent witticisms of *Punch* seems to have made them pause. They have, apparently under that influence, suspended all further action in the matter, until some more rational plan can be devised for supplying the lamps with gas by measured quantity than by adding to the disfigurement of the streets now produced by the carburetting boxes. As the deliberations of the commissioners on the subject took place with closed doors, we are unable to report what was said; but it is understood that Mr. Haywood, the City engineer, was instructed to prepare a design for a lamp-pillar, in the base of which a meter might be placed. Even that plan, if adopted, would not remove the difficulty; for, out of

the 1772 lamps which it is proposed to supply by meter, there are only 529 supported on columns, the remaining 1243 being bracket-lamps. It was suggested that, in those cases, the meters might be either fixed close to the walls of the houses, or let into them, or be placed under the pavement. We much doubt whether the powers of the commissioners extend to cutting into the walls of houses for the insertion of meters, in defiance of the wishes of owners or occupiers; and the sinking of a well into the ground, with a flap over it, is estimated by the engineer to cost nearly as much as the meter. The difficulties that have arisen to obstruct the fixing of a meter to each lamp have given rise to the question, whether it would not be better to have recourse to the plan of laying mains for the exclusive supply of the public lamps and City offices, the quantity consumed to be measured by one meter placed at the junctions of each of those special mains with the mains of the gas company. The commissioners have, indeed, the power, under the Metropolis Gas Act of 1860, of demanding a supply from any of the three companies whose mains enter the City; and they might take a portion from each. To add to the difficulty of the arrangement first proposed, the specification prepared by the City engineer for the supply of meters was so stringent in its conditions, that the meter makers were prevented from competing, only one tender having been made for the whole quantity required; and its consideration was deferred.

We reprint that specification in another column, together with the specifications of the terms of contract for supplying gas to the public lamps in the City during the ensuing year. If the conditions imposed by the former were so severe that only one meter-manufacturing firm out of the many in the metropolis could be found bold enough to make a tender for the whole, we may venture to predict, that not one of the three City gas companies will compete for the supply of gas to the public lamps on the terms proposed in the two specifications that have been submitted to them. The first is for the supply through meters of the 1772 lamps to which the carburetting process is now applied; and the second specification is for supplying the remaining 1112 public lamps in the City by contract, at a fixed price per lamp. There is a third specification, which relates to the supply of naphtha to the carburators, and to the lighting, &c., of the lamps to which they are attached. The first specification is not so objectionable as the second, but by one of its conditions the gas company is sought to be made responsible for the uniformity of the supply to each street-lamp, and by another it might for an indefinite time be obliged to charge for the quantity supplied according to the average consumption of a comparatively small number of metered lamps, whilst the lighting and extinguishing of the gas would be under the entire control of the commissioners. Judging from the difficulty that exists in making arrangements for fixing a meter to each lamp, it seems not improbable that the whole term of the contract would expire before that arrangement was completed, and, in the meantime, a large proportion of the lamps would be supplied on the objectionable system of averages; the fallacy of which Mr. Haywood himself endeavoured to expose in his recent report on the public lighting of the City. In that report, he asserted, as the result of several rough observations, that the metered lamps were supplied with larger quantities of gas than the unmetered lamps, when lighted by the servants of the company; and the opposite effect might, of course, result, when the servants of the commissioners lighted the lamps. According to the terms of the second specification, the company who supplied gas on those conditions, would be placed entirely at the mercy of the engineer, or of any other officer to be appointed by the commissioners, for the work is to be done "to the satisfaction" of such officer, without appeal to higher authority. Should the company fail to satisfy the engineer, the commissioners might contract with other parties for lighting the City, with gas or otherwise; and the original contractors must then reimburse any sum that might be expended in consequence of making such subsequent arrangement; or the contract might be put an end to by the commissioners, on giving fourteen days notice to the company. Among other stringent conditions, it is required that the minimum supply of 5 cubic feet per hour shall be provided, to obtain which, at least an average quantity of 6 feet per hour would be required. The list of penalties to be paid to the commissioners, on its being proved, to their satisfaction, that the conditions of the specification had not been complied with, is sufficient to frighten any gas company from subjecting themselves to such impositions. The penalty imposed by the Metropolis Gas Act for deficiency of illuminating power, is sufficiently severe, but the specification attempts to override the Act of Parliament, and, not only doubles the penalty from £50 to £100, but directs that the money shall be paid to the commissioners instead of to the receiver of the metropolitan police district. There is a penalty of £20 also imposed in case any burner, by obstruction or otherwise, should fail to consume, on an average of one night, the prescribed number of cubic feet per hour. As the commissioners, or their officers, are to be the judges of the offence and the recipients of the penalties imposed, those who would voluntarily subject themselves to such conditions must have a much higher opinion of the justice and impartiality of the commissioners than is entertained of public bodies generally. Of the third specification, we need only say that it contains conditions so stringent and impracticable that, if any contractor be found to make a tender for the supply of the carburators on such terms, it will be almost impossible they can be rigidly adhered to.

The application of petroleum to the production of gas, is exciting attention in America, where it can be most profitably used for the purpose, and a recent number of the *Journal of the Board of Arts and Manufactures for Upper Canada* gives the results of a series of experiments on a practical scale, on the manufacture of illuminating gas from petroleum, which, in the absence of more complete data, possess considerable interest. The experiments were made at the gas-works which supply the small towns of Homer and Courtland, in the State of New York, and the process employed is stated to be similar to that by which the gas is made with which Stevenson House, St. Catherine's, is lighted, as noticed in our "Circular" on the 4th of last month. Two iron retorts, 7½ feet long, 16 inches broad, and 12 inches in height, were employed in these experiments. Two vertical tubes were cast on to each retort, for the purpose of supplying continuous streams of petroleum and of water; the purpose for which the water is said to be introduced in the retort being "to convert the volatile hydrocarbon vapours into permanent gas." Each of the two retorts, which were set in the same manner as ordinary coal-gas retorts, was divided into three compartments, called respectively the petroleum, the water, and the coke chambers. The mean of two experiments gave the following results:—the total quantity of gas made was 5280 cubic feet; the time occupied in making the gas was 5 hours 35 minutes, or very nearly 1000 feet per hour, being 500 feet for each retort; and the petroleum consumed was at the rate of 11 gallons per 1000 feet. The illuminating power of the gas was *supposed* to be four times greater than that of ordinary coal-gas; but, in estimating the relative values of the gas produced from petroleum and from coal, the illuminating power of the former is assumed to be only three times greater. The proportionate illuminating powers of the two gases being estimated as 3 to 1, our Canadian contemporary thus proceeds to calculate the cost:—

Assuming that two benches, each containing two retorts, are used for making petroleum and coal-gas respectively, the cost of apparatus in the first instance is about the same. The time for heating, and the fuel consumed, are the same. The cost of 11 gallons of petroleum (or 1000 feet of petroleum-gas), at 6 cents a gallon (the price in Toronto), is 66cents. The cost of 250 lbs. of coal, or 1000 feet of coal-gas, at 5$ a ton, is 62½ cents. But 1000 feet of petroleum-gas is, at the lowest esimate, equal to 3000 feet of coal-gas. Hence, the lowest cost of 3000 feet of coal-gas (equal to 1000 feet of petroleum-gas), or 750 lbs. of coal, at 5$ a ton, is 1$ 87½ cents (7s. 8d.) Then, there is the coke to be deducted from the price of the coal used in making 3000 feet of gas, which may fairly be set against the smaller amount of labour required in handling the petroleum when compared with the handling of the coal.

It appears, therefore, that where petroleum costs 10 cents (five pence) per gallon, and the price of coal is 24s. per ton, the cost of the raw material for making 1000 feet of petroleum-gas is 4s. 5d., the illuminating power of which is estimated to be equal to 3000 feet of coal-gas, which costs, for coal alone, 9s.; the same amount of light being produced with petroleum-gas, for about half the cost for the raw material. There are other things also to be taken into account in favour of petroleum-gas. The number of retorts required would not amount to more than one-third the number necessary for the production of coal-gas of equal illuminating power; but, on the other hand, we apprehend the destruction of the retorts is more rapid; the quantity of lime required for purifying the gas will be much greater than with coal-gas, on account of the large proportion of carbonic acid contained in the petroleum hydrocarbon-gas. These are important considerations, and it is to be regretted that the details given are not more precise and reliable. The estimate of the relative light-giving powers of

the two kinds of gas is especially defective, and on that point the advantage of using petroleum mainly depends. It is evident, from the construction of the retorts, and from the description of the process of manufacture, that a large proportion of water-gas was produced, which must have materially diminished the illuminating power of the petroleum-gas with which it was mixed. This rendered it more essential that the comparative illuminating powers of the two gases should have been accurately tested; and, in the absence of such test, the experiments, though conducted on a practical scale, are unsatisfactory, and afford no safe ground for conclusions respecting the value of petroleum for making gas, even under the favourable conditions that the raw material was obtained. We understand that a company has been formed for the purpose of facilitating the importation of petroleum into this country by bringing it in bulk, in ships constructed for that object, so as to save the expense of casks; and by that means it is expected that rock-oil may be delivered at Liverpool at 50s. per ton on the Canadian price. If that project be realized, Canadian oil may be sold in Liverpool at £7. 10s. per ton, or about 7d. per gallon, at which price it might come into competition with cannel coal in the manufacture of the richer kind of illuminating gas.

Webster's process for the manufacture of oxygen gas continues to be a subject of discussion in the *Chemical News*, without any satisfactory elucidation respecting the cost of production. Mr. Dugald Campbell, in a report—which is inserted in another column—states that he has obtained gas by that process, in which only 26¼ per cent. of nitrogen was present, instead of 42 per cent., as in the gas analyzed by Mr. Pepper. The light exhibited in Parliament Street supplied with oxygen-gas so obtained, which we noticed in our last, continues to attract attention by its superior brilliancy; but, unless some correct observations are being made of its consumption of gas and of oxygen, and of its illuminating power, compared with the street-lamps in the neighbourhood, the experiment can have little practical value. We have observed a flickering halo round the flame at times, which seems to indicate the presence of nitrogen in some other form than as pure gas.

The *Dover Telegraph* exhibits a rancorous feeling towards the contractors for the Dover Gas Company, apparently oblivious of its recent escape from an action for libel, by giving up the name of the writer of a calumnious article. When fresh matter cannot be raked up against them, it repeats the previous charges extracted from another local paper, without having the honesty to insert the ample refutation of those charges. The *Cinque Ports Pilot*, following in the wake of the *Dover Telegraph*, inserted the article from the *Builder*, on which we recently commented, with some introductory remarks; and those remarks, with the accompanying article, are reproduced in the *Telegraph*, to keep up the show of grievances, at the same time concealing the fact that those grievances have been proved to have no other foundation than the carelessness of those who complained. This mode of dealing with a question in which the characters of the contractors are implicated, is opposed to the principles of fair dealing, and is discreditable to the press of this country. We are gratified to turn from such instances of disingenuousness to the mode of treatment, by an independent public print of a different order, of a subject respecting which much obloquy has been often ignorantly thrown on gas companies. The *Social Science Review*, in an article on "Sulphur in Gas," treats the subject so fairly, that we have been induced to transfer the article to our columns. Of the existence of such a publication we were not aware, until our attention was directed to the article in question, which explains, in a clear and intelligible manner, in what form sulphur becomes combined with coal-gas, how it is extracted, and the infinitesimally small quantity that remains in it after having undergone purification. It is not, however, so much for the matter contained in the article as for the impartial and candid manner in which it is written, that we present it to our readers, as a contrast to the ignorant and prejudiced mode in which gas matters are usually treated in public journals. The writer has, indeed, fallen into an error, in noticing the process of purification by oxide of iron, which it may be desirable to correct. During the revivification of the spent material by exposure to the air, no sulphuretted hydrogen is emitted; the disagreeable smell that is perceived arises from the naphthaline, or other hydrocarbon compounds which have been absorbed by the oxide during the purifying process, and are afterwards mingled with the atmosphere. The smell complained of is not to be compared to that given off by the spent lime, when that substance is the purifying material, and which renders gas-works in populous neighbourhoods a serious nuisance.

The Newcastle and Gateshead Union Gas Company announced last week their intention to reduce the price of gas from 4s. to 3s. per 1000 feet. This great reduction, though not formally made known until after the notice of application to Parliament for the incorporation of a new company, is stated to have been contemplated by the directors months ago, and some notification had been given that a reduction of price would be made when the new works were completed. The promoters of the new company will, of course, attribute the reduction to their threatened opposition; and it is certainly unfortunate that the directors, if they did intend it, should not have made the announcement before notice was given of opposition. By the adoption of this vigorous course, the directors may for the present put a stop to the proceedings of the new company, but they pay a heavy penalty for their obstinacy in delaying to place the company under parliamentary regulation, for they run the risk of having the low maximum price of 3s. forced on them whenever they apply to Parliament, as they must do sooner or later, unless they rather choose to continue to hold out to speculators the temptation to form a competing company. Whether the new company will venture to proceed, in the face of the great reduction in price that has been now made, remains to be seen.

The revision of the valuation lists of property liable to be assessed under the Act passed last session for amending the laws relating to parochial assessment in England, and to which the title of "The Union Assessment Committee Act, 1862" has been given, is now in full operation, and threatens to be a fruitful source of litigation between parochial authorities and such public companies as occupy their own premises. To "revise" the assessment of a gas company especially, is generally to increase it up to the speculative value assigned to it by a class of theorists who are growing rich by the litigation that follows the adoption of their views, and who, consequently, disregard the lessons their many failures ought to teach them. An expectation prevails, from the long delay which has taken place in the delivery of the judgment of the Court of Queen's Bench on a case submitted to them relating to the assessment of the mains of the Sheffield United Gas Company, and argued two or three terms since, that some new principle is about to be laid down by the court for the assessment of such property, as it is clear they have been struck by the arguments urged by the counsel for the gas company, and are desirous of establishing some more equitable system than that now prevailing. A case relating to the assessment of the London Docks is reported in another column, and corroborates all we have expressed relative to the doubt raised by the old Cambridge gas case, as to whether "quantity" was to be interpreted *superficially* or *structurally*. The arbitrator in the dock case seems to have adopted the former; and hence has not done justice to the parish in which the principal and most valuable part of the property in question is situated.

We have so often experienced the want of proper records of pressure taken at different points over a whole district during the hours of the maximum consumption of gas, in places where we have been called upon professionally to advise as to proposed enlargement of the mains, that we would suggest to managers of gas-works the advisability of making observations of the pressures in the mains in various parts of their districts between the hours of 5 and 7 p.m., for several evenings during the rest of this month; such records will be invaluable for reference at future periods.

As we propose reprinting, in our next number, the Share-Lists of Gas and Water Companies, we shall be obliged by our readers pointing out any change which may have taken place, of which we have not been already advised, in the paid-up capital, dividends, or value of shares, since the publication of the last list on the 29th of July last. Corrections sometimes do not reach us till after the publication of the list; and, as it is our wish to obtain the most complete accuracy, we trust our readers will favour us with the required corrections in due time.

Correspondence.

THE SUPPLY OF GAS TO STREET-LAMPS.

SIR,—It is now very generally understood, by those interested, that the system of supplying gas to street-lights arbitrarily, or "by contract," is commercially wrong; and the necessity and righteousness of buying and selling on a principle understood and appreciated by all, are daily becoming more apparent. Here and there across the country a town is found where gas to the lamps is supplied by meter (strictly speaking, partly by meter and partly by computation); and this arrangement has in some instances been found to work to the satisfaction of all concerned, but it does not always do so. The proposal, frequently recommended in your columns, to have a meter for every lamp, though apt to frighten many on account of the expense and trouble involved in adopting it, is, I am convinced, the only method by which it is possible to do strict justice to buyer and seller and end all "squabbles" and suspicions, which any other system must sooner or later create between them. The subjoined note of the results of a few observations on the nightly consumption of some metered lights, in a town where the average number of meters affixed is 1 to every 10 or 12 lamps, points to this, and may not be without value. It is at least curious.

The corporation light and extinguish. The meters are "dry," and, with the exceptions referred to in the observations, were manufactured expressly for street-lamps, by Messrs. Croll, Rait, and Co. As there was a doubt felt as to the correctness of these meters, two, showing the greatest variations, were taken up and severely tested. The registration proved invariably correct. One meter, after 100 cubic feet of gas were passed to it through the test-meter, showed a difference of only half-a-tenth of a foot; the other (by another meter) showed nearly 1 per cent. fast. Not being a very ardent admirer of dry meters, I was pleasantly disappointed to find these small meters so near perfection.

J. M.

Quantity consumed Nightly, in Cubic Feet, over Nine successive Nights.

1st District.		2nd District.		3rd District.		4th District.		5th District.		6th District.		7th District.		8th District.		9th District.	
To 12 o'Clock, Midnight.	To Sunrise.	To 12 o'Clock, Midnight.	To Sunrise.	To 12 o'Clock, Midnight.	To Sunrise.	To 12 o'Clock, Midnight.	To Sunrise.	To 12 o'Clock, Midnight.	To Sunrise.	To 12 o'Clock, Midnight.	To Sunrise.	To 12 o'Clock, Midnight.	To Sunrise.	To 12 o'Clock, Midnight.	To Sunrise.	To 12 o'Clock, Midnight.	To Sunrise.
																†	†
21	35	12	43	25	45	32	34	14	40	20	48	22	49	35	30	30	40
29	32	25	42	42	30	23	41	26	38	19	52	28	44	38	28	20	40
*22½	*43½	*23½	*47	*35	*49	*22½	*52½	*24½	*34	*20½	*54	*20	*52½	*41	*37½	*25	*30
*22	*35	*18	*45	*36½	*49	*31½	*35	*32	*40½	*24	*46½	*24½	*40½	*33	*33½	*25	*25
17	38	25	41	45	39	21	37	21	42	24	70	26	51	23	32	25	30
0	45	13	50	43	38	26	51	30	44	30	68	28	56	50	42	25	50
20	41	23	50	36	44	28	43	30	28	30	58	30	50	40	39	20	30

* Average of two nights.
† No great importance is attached to these columns, as the meters, having the ordinary 1-light index, prevented accurate determination of the quantity consumed. There are two meters for each district.

Register of New Patents.

1001.—HOWARD ASHTON HOLDEN, of Birmingham, Warwickshire, merchant, and CHARLES WEEKES, of the co. of the borough of Carmarthen, Wales, civil engineer, for "*Improvements in apparatus used in drawing water or other fluids from cisterns, tanks, or other vessels.*" Provisional protection only obtained. Dated April 8, 1862.

This invention has for its object improvements in apparatus used in drawing water, or other fluids, from cisterns, tanks, or other vessels. For this purpose, the outlet-pipe enters the bottom of the cistern or vessel; and to the end of this pipe is connected a flexible pipe; this pipe is of such a length that its mouth or open end can be raised above the level of the water or fluid in the cistern or vessel, so that no water can pass away through the outlet-pipe; but, when the mouth or open end of the flexible pipe is depressed below the water-level, the water can flow freely through the outlet-pipe. In order to raise and lower the mouth of the flexible pipe, it is preferred to connect it to one arm of a lever, the other arm of which projects beyond the edge of the cistern or vessel; so that by acting on this arm the mouth of the flexible pipe may be raised or lowered.

1017.—WILLIAM EDWARD NEWTON, of 66, Chancery Lane, London, W.C., civil engineer, for "*An improved apparatus for raising and forcing water, and other liquids.*" A communication. Patent dated April 9, 1862.

This improved apparatus for raising and forcing water, and other liquids, consists principally of a steam or compressed-air pipe, the mouth of which enters and is surrounded by a socket, in which is an opening for the admission of the water or other liquid to be raised from the well, reservoir, or other source of supply; and from which a delivery-pipe leads to the point where it is to be delivered—the direction of the steam or air-pipe being the same as that of the contiguous portion of the delivery-pipe.

The issuing steam or compressed air expels the water from the delivery-pipe, and creates a vacuum behind it. The place of the water so expelled is supplied by water drawn up to fill the vacuum, or forced up into the socket from the well, reservoir, or other source, by the pressure of the atmosphere.

The apparatus may be used with great advantage in raising water from mines, as it will work at any depth or at any distance from the boiler, to which steam can be conveyed, and will raise it to any height. It may be also used as a substitute for a fire-engine in extinguishing fires; or for other purposes which require water to be ejected with considerable force, the issue from the end of the delivery-pipe being very forcible when a high pressure of steam is used. Compressed air may, as above-indicated, be used in place of steam, to effect the same purpose, such air being admitted through the pipe in the same manner as the steam as above-described.

The claim is for the combination of a steam or air-pipe with an open socket and delivery-pipe, with its check-valve and chamber, the whole operating substantially as and for the purpose herein specified.

1021.—DANIEL FRYER, of Carlton Square, Old Kent Road, London, S., and WILLIAM JAMES WILLIAMS, of Arundel Street, Strand, London, W.C., gentleman, for "*Improvements in the method of, and apparatus for, letting on and cutting off the supply of gas to groups or districts of street and other lamps, from a central point, or dépôt.*" Provisional protection only obtained. Dated April 10, 1862.

It is promised that this plan of letting on and cutting off the supply of gas from street-lamps is applicable in whatever way the lighting of the lamps is effected, whether by hand, or by mechanical or chemical arrangements, or by means of the electric spark, as one of the leading features of this invention gives, however, a method of simultaneously extinguishing a whole series of lamps, by means of an almost instantaneous cutting off of the supply of gas, and as almost instantaneous the letting on of the gas is by the same apparatus effected. The arrangement of lighting by means of an electric spark passed along a wire to each lamp is preferred. The inventors are, however, aware that such has been previously applied; hence, they do not claim this method of lighting, except when used in connexion with this invention for letting on and cutting off the supply of gas to the lamps. Their plan consists in applying to the ordinary branch gas-tube which supplies each lamp a flexible air-tight junction of india-rubber, or such-like material, that is to say, the gas-tube may be severed, and a piece removed anywhere near the lamp-post, and the severed ends joined with a piece of flexible tube, having air-tight joints. On each side of the tube may be placed two small plates, to act as nippers, so that, if they be compressed by any force, they will nip the flexible tube, and close the passage. This flexible portion is now enclosed in an air-tight flexible chamber, formed of materials capable of allowing it to collapse and expand without fracture when the air is withdrawn or forced into it. With this arrangement, it will be seen that, if the air by any means be extracted from the air-tight flexible chamber, it will collapse, and the external pressure will cause the nippers to grasp the flexible tube, and close its passage, and cut off the supply of any gas passing through to the lamp; and, upon the equilibrium being restored by the admission of air, the current of gas will be let on, the nippers relaxing their grasp from this relaxed pressure. If, on the other hand, the air be forced into the chamber, the increased pressure will act in a similar manner.

In order to exhaust or force in air to these flexible air-tight chambers, the following arrangement is adopted:—Starting from each central point, or *dépôt*, an air-tight pipe passes to each group or district of lamps, and from this tube an air-tight junction-tube proceeds to the flexible chamber attached to the supply-pipe of each lamp, and terminates in an open end in the said air-tight chamber; the ends of all the main, or district-pipes, are collected, or terminate in an air-tight tank or chamber, to which is attached a large air-pump or air-exhausting machine. By means of the pump or machine, it will be seen that the air may be withdrawn or forced into the flexible chamber at each lamp, and the gas either cut off or let on at pleasure, and almost instantaneously.

1040.—JAMES THOMAS GRICE, of Birmingham, Warwickshire, tube-maker, for "*Improvements in the manufacture of twisted metallic tubes.*" Patent dated April 11, 1862.

This invention relates to the manufacture of metallic tubes of the kind commonly known in commerce as twisted tubes, that is to say, tubes in which a convex or concave flute or other pattern is arranged in the form

of a helix. The said tubes may be manufactured by taking tubes on which the flute or pattern is made in lines parallel with the axes of the tubes, and twisting the said tubes by holding one end stationary and giving a rotatory motion to the other end, or by giving rotatory motions in opposite directions to the opposite ends of the tubes. It frequently happens that the tubes offer less resistance at some parts than at others, and yield irregularly to the force applied. In this case, the twisted pattern produced is not uniform or regular. The object of this invention is to prevent this irregular yielding of the tube while it is being twisted.

This invention consists, firstly, in filling the tube to be twisted with pitch, or lead, or sand, or other yielding substance, whether solid or in powder, and afterwards twisting the tube thus filled, by fixing one end of the tube in a die or holding-tool, and taking hold of the other end by means of pliers or other tools and applying a rotatory force thereto. Or, a rotatory force may be applied to both ends of the tube, the motions being in opposite directions. The required twist or helical figure is thus given to the tube. After the tube has been twisted, the filling material is removed by fusion or otherwise, according to the nature of the filling material employed.

This invention consists, secondly, in placing in the tube to be twisted a small rod or mandril of steel or other hard unyielding metal or material, instead of completely filling the tube with a yielding material. The said rod or mandril is of much smaller diameter than the tube to be twisted; that is, the said rod or mandril must have a diameter not greater than the diameter of the smallest part of the twisted tube to be made. The tube is twisted upon the small hard mandril, in the same way as that described when a yielding material is employed in the tube. By the use of a yielding material, or a hard mandril of small diameter in the metallic tube to be twisted, the said tube is prevented from collapsing while being twisted, and a very uniform twist is given to the tube. As the surface of the tube is untouched during the twisting process, this invention is especially applicable to the twisting of tubes, the surfaces of which have been ornamented previous to twisting.

The claim is for the improvements in the manfacture of twisted metallic tubes hereinbefore described, that is to say, filling the tube to be twisted with a yielding substance either solid or in powder, or inserting in the tube to be twisted a small solid mandril of steel or other hard substance, for the purpose of preventing the irregular yielding of the tube during the twisting process.

1075.—Richard Archibald Brooman, of 166, Fleet Street, London, E.C., for "*Improvements in pumps.*" A communication. Patent dated April 14, 1862.

The characteristic feature of this invention of improvements in pumps is the employment of two shafts together with inclined pump-barrels and pistons, as hereafter explained. One of the shafts is inclined at any desired angle, and the two shafts are coupled together by a universal or other joint ensuring the same speed to both, and causing them to revolve in the same direction. One of the shafts carries, through a horizontal disc or cross-bars, a pair or more of pump-barrels, set at the same angle as the inclined shaft, while the other (say, the inclined shaft) has fixed on the lower part an inclined cross-head with rods and pistons, also inclined to correspond with and work in the pump-barrels.

A vessel or case fitted with a cover, which may be removed when required, has a suction-pipe fitted at the lower, and a discharge-pipe at the upper part; both pipes are provided with suitable valves, and in this vessel the barrels and pistons are enclosed. The pump-barrels (say, four) are suspended from the under side of the horizontal disc or cross-bars in such manner as to be able to adapt themselves to the inclinations of the pistons. A ring of some strong flexible material unites and keeps the pumps water and air-tight, so that the top of the pump-barrels is in communication with the discharge, while the top of the pump-barrels is in communication with the lower part of the vessel. A diaphragm may, if desired, surround the lower part of the plate.

The claim is for the employment in pumps of two shafts jointed together, and of inclined pump-barrels and pistons, all being fitted and caused to act substantially as hereinbefore described.

1128.—Richard Archibald Brooman, of 166, Fleet Street, London, E.C., for "*Improvements in taps and valves.*" A communication. Patent dated April 17, 1862.

The objects of this invention are the construction of taps or valves applicable to water-pipes or passages, to water-posts and mains, to house supplies, as well as to pipes used for delivering water to towns and other places.

The invention consists in causing the valves through which the water passes to open by an opposite pressure of water, which counterbalances the resistance offered by the inlet-water to keep the valve open, and to allow it to close gradually without jerk or shock, as hereafter explained. When the tap or valve is applied to water-posts or water-mains, provision is made for allowing the water, which during winter would be exposed to the action of frost, to run away when the tap is turned off; for this purpose, the tap is placed under ground, out of reach of the action of frost. A pipe conveys the water to the surface, which, when the tap is open, becomes filled with water, and it would necessarily remain so, even after the tap is closed, unless some means were afforded for emptying it. The object of one part of this invention is to accomplish this.

The tap is divided into four distinct parts, carrying a discharge-pipe at its upper end. The tap is divided into three chambers or cells, which, together, form the barrel, which is made of cast iron or other material, and in three distinct parts; it is screw-threaded at its lower end, to attach a pipe to it, and has flanges at top, whereby it is connected by bolts to the second chamber—a leather, caoutchouc, or other washer being placed between. The second chamber has on one side an exit-pipe, and the rest is covered by an oblique truncated cap; below the cover, the valve is fitted, the upper and lower ends of which terminate in flanges, and are secured by bolts. In the cover, there are passages in communication with the lower and upper end of the barrel. The cap or cover itself is composed of three parts, one of which is made of cast iron, with a projecting rib at top, of sufficient thickness for passages to be bored through or formed in it. This cover is secured to the barrel by flanges and bolts, and the joint is rendered secure by a caoutchouc washer, but a leather, metal, or other washer may be employed. This washer is corrugated, to allow for expansion, and forms a sort of elastic partition between the second and third chambers. The cover is provided with a tap, made by preference of copper, inserted in the cap, and there screwed by screws. The valve-key is bored vertically, having two small holes at top; it has also a square head for turning it, and is fitted with a lever, carrying a hook, which abuts against a cam-stop. The valve-rod is screw-threaded at both upper and lower ends, and carries three blades or wings, each set at an angle with the valve-rod; they act as guides to the rod during its up and down motions; two of the wings extend up a portion only of the rod, while the third extends from end to end. Two discs are placed above and below the screw-threaded portions of the rod, the upper of which receives a copper washer, to which a caoutchouc washer is affixed, which latter presses against another copper washer. The lower part of the rod forms the valve, and a disc holds the three wings on this point; the valve itself is composed of a caoutchouc washer embedded in a copper disc, the edge of which is bent to clip the caoutchouc all round—the washer or thin copper disc being pressed down by a second washer. Water, which enters by the pipe at the base of the first compartment, presses the valve upwards, as well as the corrugated caoutchouc disc before mentioned, and thereby gradually close the valve. Now, by turning the key in one direction, water is allowed to pass by the apertures in the cover, in the third or upper chamber, above the caoutchouc disc, which, as it fills the chamber, the caoutchouc becomes gradually depressed against its metal disc upon the valve, and opens it, whereby a passage is afforded between the valve and its seat, for water to enter from below—that is, from the first to the second chamber, and thence by exit to the pipes, from which it is withdrawn. The valve-key has two holes in it; the lower affords a passage for water to and from the chamber above the valve, while the upper is for affording a direct communication with the atmosphere, and the same chamber which is necessary when the tap is first turned. The arrangement for preventing the stoppage of the pipe by liquid freezing therein, consists in the employment of taps arranged in such manner that, when the exit-tap is open, the discharge-tap is closed, and *vice versâ*; and this is effected by means of the cam on the key-lever before described. There is an apparatus or vane for regulating the supply of water, consisting of a cylindrical chamber somewhat bent at bottom; inside, there is a screw-threaded rod passing through lugs connected to the chamber; the head of the rod is square, to receive a key.

According to another arrangement for a tap, the rod above the axis of the valve carries an eccentric conical pinion, communicating motion to a lever, the opposite end of which carries a plug for closing an aperture above the branch of the exit-pipe. The pinion being eccentric, causes the lever to make a rotary motion about its own axis, and, at the same time, an up and down motion, which opens or closes the aperture above.

The claim is for—

1. The construction of taps with internal valves and chambers, acting in manner, and for the purposes hereinbefore described.
2. The employment of a central rod, plug, and chambers, in manner, and for the purposes hereinbefore described.
3. The method hereinbefore described for preventing the action of frost on the tap.
4. The arrangements hereinbefore described for regulating the supply of liquid; and
5. The construction of valves as hereinbefore described.

1142.—Benjamin Rhodes, of Old Ford Road, Bow, Middlesex, for "*Improvements in the machinery for, and in the method of making, as also in the materials to be employed in the manufacture of, cylinders, tubes, and other vessels, from paper, and other materials or fabrics.*" Patent dated April 19, 1862.

For the purpose of making cylinders or tubes, of the ordinary diameters in common use, two carriages are mounted within a frame, each of which is formed by two beams or arms fixed upon the ends of an axis or shaft. The shaft of one of the carriages may either work in bearing-pulleys, and be worked back and forward by means of a pinion or pinions taking into a rack or racks, or it may otherwise be moved or caused to travel back and forward in the main standards or framing of the machine. The other carriage may be so arranged as to vibrate up and down on its central axis or bearing-shaft. Each carriage has at the outer end of each side-beam or arm a curved rack or other means of raising and depressing it; whilst, at the inner ends of the said beams, a "gab" or open bearing is provided, for receiving the spindle or shaft of the mandril or mould upon which the cylinder or tube is formed.

When the paper or other material is being wound around the core or mandril, it may be supported in the "gabs" or bearings of the vibrating carriage only; or in the "gabs" or bearings of both sets of carriages; at the same time, and, whilst the process of winding up or forming is progressing, the cylinder or tube runs in contact with a cylinder beneath, as well as a cylinder above; and, where the machine is employed for making bitumenized paper pipes, the lower cylinder revolves in a bath of hot bitumen; and the upper roller is made hollow, and capable of rising with the increase of diameter; and, by means of a circulation of cold water within such roller, the cooling of each layer may be effected as the tube or cylinder is formed. After the required diameter or thickness has been attained, the moving or travelling carriage is caused to withdraw the mandril or core, with the cylinder or tube formed thereon, and bring it against a second cooling and polishing cylinder or roller; the first carriage being set free, and ready for the formation of another tube or cylinder. Instead of the sheet of paper, or other fabric, passing from the reel or roll into the bitumen pan around a roller or guide, and so on to the mandril or core, the patentee mounts two rollers or cylinders within the bitumen pan, and regulates their distance apart as a means of governing the quantity of bitumen taken up by the sheet; and also by increasing the diameter of the cylinders, increase the distance through which the paper must pass.

These two cylinders or rollers may be formed of fine wire-gauze, so as to ensure the liquid bitumen coming in contact with both sides of the paper, that it may thoroughly penetrate and fill the pores thereof.

For the purpose of hardening the surface or surfaces, and also, in some

cases, for increasing the adhesion, finely-powdered sulphur may be delivered on to the surface of the sheet either as it enters or passes out from the back. For making cylinders of large diameter, whether the same are to be employed for tubes or other purposes, the patentee mounts two cylinders upon the main framing of the machine, and the core or mandril is supprted in a carriage capable of sliding or traversing as the paper or fabric is found thereon; the surface of the paper or other fabric running against the surface of one of the cylinders working in bearings mounted upon the main framing, and this may be kept cool by the circulation of cold water. When the cylinder or tube is completed, the mandril or core upon which it is formed is allowed to pass out of the carriage or bearing into a corresponding pair of bearings at the other end of the frame, where it may be polished and finished by being caused to work in contact with the surface of the second revolving roller or cylinder; but, if it be preferred to employ only one revolving cylinder instead of two, in the front part of the machine, then the paper or other cylinder or tube may be polished and finished on the opposite side of the revolving cylinder to that upon which it was made or wound up, the carriage supporting the core or mandril being maintained in contact to give the required pressure by means of springs or counter-weights. Instead of the fabric being passed into and through one bitumen pan, or through a bath of bitumen of one density or consistency, the patentee prefers, for the purpose of more thoroughly saturating the sheet to be wound up or formed into a cylinder or tube, to pass it first through a bath of very thin or fluid bitumen, or solution; and, again, before it is wound on to the mandril, he prefers to pass it over a cylinder within a bath of bitumen of greater consistency. A convenient mode of effecting this, in connexion with the machinery or apparatus for making cylinders or tubes of large diameters, is by constructing a large bath above the level of the machine, and mounting within it two rollers of the same or different diameters, and passing the sheet from the roller under the first cylinder, half round it, and up to and over the second cylinder, from whence it may pass on a level on to the core or mandril; a smaller bath being mounted beneath the mandril, and a "ductor" (or doctor) roller revolving freely therein, by which the thicker bitumen or mastic is applied to the under side of the paper or other cylinder in course of making. Instead, however, of the second bitumen bath being so placed, it may be in the same line or level as the first bath, or a single bath or vessel may be formed with a partition between for holding the two qualities of bitumen, and a cooling and pressing roller may be applied on the under side of the mandril or core. For the purpose of cutting the sheet at the proper time, when the cylinder or tube has been formed, a series of curved blades are mounted upon a bar and connected together, so that by one stroke the whole of the knives, which extend across the width of the sheet, are caused to cut simultaneously, leaving the edge of the sheet ready for again commencing work, the cutting apparatus being mounted as close to the mandril or core as practicable. For the purpose of squaring the ends of finished tube, as also for the purpose of forming collars or "muffle pieces" from long pipes, a series of holders or carriages are mounted upon a rocking-bar, into which knives or cutters are fitted and secured by means of screws or keys, the distance between the holders or carriages being also capable of adjustment upon the rocking-bar, so that the position of the knife or cutter is regulated, and their distances apart capable of adjustment.

For the purpose of jointing or securing the ends of pipes or tubes formed as herein described, the ends are opened out, or "bell-mouthed," being first warmed, and either fitted in a double-cone thimble-piece, having the ends coated with hot bitumen, and then a "muffle" drawn over it, filling the interstices with liquid bitumen; or, after the ends have been lipped over, or bell-shaped, round wire rings or collars are put on, and, behind these, plates or flat collars are brought up, having bolts and nuts passing through them, by which the two ends are brought together; thus, the joints may be made and an uniform pressure applied thereto, and, by suitable adjustment, any variation in the angle in the joint may be produced. Instead of mounting two carriages, distinct and separate, in the manner hereinbefore previously described, the patentee prefers to mount one of the vibrating frames, with its roller above the main cylinder at the one end (the front end) of the main framing, and, instead of a rack or travelling frame for transporting the tube and its mandril from the one end of the machine to the other, he connects the front and back parts of the machine by means of rails or bars, inclined downward from the front part to the back part of the machine; and, by means of compound "jaws," the mandril may be released from the vibrating-frame at one end, allowed to roll down to the back part of the machine, and there be held or secured, so that it may revolve in contact with the finishing-roller, and, instead of the travelling-carriage hereinbefore previously referred to, the incline-rails reaching from the front to the back part of the machine may be substituted therefor.

Rollers and cylinders with conical additions at their ends, are also used for forming the ends of the pipes corresponding thereto, but, for making plain or parallel tubes, these would not be used, and they may be removed.

In making pipes taper, or of different thicknesses, the paper or sheet of material is gradually or proportionately reduced in width before it is wound on. Instead of bitumen being employed alone in the bath or pan for coating and saturating the paper or other material, the patentee employs the distilled gas-tar in combination therewith, or forms a mastic with bitumen and any convenient liquid capable of resisting the action of water and air, and thickens it or gives the requisite consistency by adding argillaceous matter.

The claim is for—

1. The general construction and arrangement of parts of the machinery or apparatus herein described.

2. The use or employment of one or more perforated cylinders or rollers, or a cylinder composed of wire-gauze covering, revolving in a bath of bitumen or its equivalent, for the purpose of ensuring the more thorough saturation, and coating of the material employed for forming pipes, tubes, or cylinders.

3. The employment of inclined planes for conveying the mandrils from one part of the machine to another, by which the pipe is kept revolving, and which entirely prevents the hot bitumen from draining down, or sagging to one side of the pipe or tube.

4. The use or employment of cold water circulating through the top pressure-roller, and the cooling and polishing cylinder of pipe-making machines.

5. The use and application of knives of the description and in the manner shown for cutting off the sheet of paper or other material employed for making pipes or tubes.

6. The use or employment of the gauging-roller in the said machine, by which all the superfluous bitumen is pressed off the sheet of paper or other fabric, thus giving an uniform thickness notwithstanding any variation in the temperature of the bitumen.

7. The arrangement of knives or cutters for squaring the ends of pipes, and also for cutting pipes into short lengths for making collars, and for other purposes, within the machine in which the pipe has been made as herein described.

1164.—James Chapman Amos, of the firm of Easton Amos and Sons, of the Grove, Southwark, in the co. of Surrey, engineer, for "*An improved mode of and improvements in apparatus for supplying surface condensers with water, part of which improvements is applicable to blowers and rotary pumps generally.*" Patent dated April 21, 1862.

The object of this invention is, first, to provide a ready access to the fan or impeller of rotary pumps, particularly when applied to the injection of water into surface-condensers, and also, when required, to the fans of blowers. In the application of rotary pumps or impellers on shipboard, and also on land, the space that can be afforded them is frequently very limited, and great difficulty has, therefore, been found in providing means for removing the fan and working parts for examination and repair, the construction of the fan-case (when not divided down the middle) requiring space to be left on both sides—on one side for the removal of the bonnet of the case, and on the other for giving the fan-axle an endway motion. It is now proposed to form the case in such manner that the mere removal of the cover will allow of the removal of the fan together with its axle and bearing.

The cover is of such proportion that, when removed, an opening will be provided superior in length to the diameter of the fan. When, therefore, the fan-shaft is disengaged from its bearings, it may with the fan be lifted out of the case, no space being required at the sides of the case for the purposes already mentioned. The line of the flange cover may, if thought desirable, be behind instead of cutting the axis of the fan-shaft, but the former arrangement is preferred. This arrangement of case, it will be obvious, is alike applicable to blowers and pumps fitted with rotary impellers, and intended to be used in a confined space, the mere withdrawal of the bolts, which attach the cover to the other part of the case and keep the impeller-shaft in its bearings, permitting of the front or most accessible part of the case being laid open to an extent that will admit of the fan or impeller, without further displacement of parts, being lifted out of its bearings.

The claim is for constructing the cases of marine and other rotary pumps and blowers in the manner above described, whereby, on the removal of an easily accessible cover, the fan may be readily removed for repairs.

1165.—Christopher Crabb Creeke, of Bournemouth, Hants, architect and surveyor, for "*Improvements in the construction of drain and other pipes.*" Patent dated April 21, 1862.

This invention relates to the substitution of earthenware or stoneware-pipes for the iron or lead-pipes now used in the transmission of gas, water, and sewage, under pressure, the object being to effect a material economy thereby, and to supersede the use of lead—found to be so injurious where employed to convey water for domestic purposes. The objection hitherto to such pipes has been their tendency to leak, from the imperfect character of the joints or couplings; this, however, it is now proposed to remedy, by constructing a joint which, when put together, is elastic enough to allow of that insensible depression at each joint the want of which has hitherto prevented the use of stoneware-pipes for the conveyance of fluids under pressure. To this end, the pipes are moulded so that their ends shall lock the one into the other, and draw lightly together.

The sockets and flanges which are employed may vary in form, so as to present either one or two abutting surfaces; but, in all cases, these ends of the pipes are moulded with wedge-shaped projections and recesses, which, by an axial motion being given to one of the pipes, shall serve to draw the ends of the pipes together and make a secure joint, preserving, however, until the joint has hardened, the elasticity referred to. Before thus securing the pipes, suitable packing or cement is inserted between the abutting surfaces, and the entire surface of the socket and its counterpart are lubricated; by which means, when the pipes are laid in place and screwed up, water or gas-tight joints will be secured.

Another improvement which it is proposed to introduce is, to form a kind of spanner-pipe, which is to be placed over the drain, water, or gas-pipe, to protect it from the superincumbent pressure when laid in positions requiring such protection.

In some cases, it is proposed to make the ends of the stoneware-pipes without flanges or sockets; and to introduce these plain ends into a short sleeve-pipe formed with recesses at its ends to receive suitable packing, gaskin, or cement.

The claim is for the means above described for effecting the coupling of, and preventing the leakage in, main and branch-pipes composed of stoneware or earthenware.

1191.—John Endean, of Lock's Fields, Walworth, London, S., brass-founder, for "*Improvements in cocks, taps, and valves.*" Patent dated April 24, 1862.

The nature of this invention consists in this: a duct or ducts is or are formed with a cock, tap, or valve-shank, as it is termed, having a chamber or valve-box provided with a solid or partially solid enlargement of the said duct or ducts, of conical or conoidal form, with the requisite apertures therein; and upon this conical or conoidal part is fitted a hollow cone or conoid correspondent thereto, provided also with apertures to correspond with the apertures communicating with the ducts, and ways adopted; so that the steam, gas, water, or fluid, will enter the valve-box or chamber, pass over or against the said hollow cone or conoid, and out at the outlet

or outlets; this hollow cone or conoid being provided with a stem, spindle, or handle, passing through the chamber or valve-box aforesaid, whereby the hollow cone or conoid may be turned so as to bring the apertures therein upon, to, or away from the apertures in the aforesaid enlargement of the duct or ducts, and thus open and shut the same as desired; and the apertures are so arranged that the inlet shall never be closed; and hence, the hollow cone or conoid shall always be kept held to its seat, with an equal pressure on its entire surface.

It will be obvious to the practical man that the details may be varied for two-way or three-way cocks, and so forth; and also that these improvements may be adopted for cocks and valves for gas, steam, water, air, and other purposes.

The water, steam, gas, or fluid will be allowed, at all times, freely to come in by the inlet-aperture, and thus press the hollow cone tightly upon, or against the enlargement aforesaid, but if this pressure should, in any case, be deemed insufficient, a coiled spring can be applied round the spindle.

The claim is for the invention as aforesaid.

1195.—William Denny Ruck, of 8, Duke Street, London Bridge, London, S.E., merchant, for "*The manufacture of grease from coal-tar coal-oil, creosote or dead oil.*" Provisional protection only obtained. Dated April 24, 1862.

This invention consists in obtaining a certain grease from coal-tar, coal-oil, creosote or dead oil. The inventor takes either of these, and treats it with sulphuric or other suitable acid; having freed it from the acid, he heats it, and runs it into cold water. It is to be well stirred; the grease then forms in lumps at the bottom of the vessel in which it is treated. The grease is to be pressed to extract the water from it. It is then suitable for lubricating purposes, and also for candle-making when mixed with other substances.

1196.—John Winsborrow, of 4, Samson Terrace, Marlborough Road, Dalston, London, N.E., gas-meter maker, for "*Improvements in wet gas-meters.*" Patent dated April 24, 1862.

The object of these improvements is to facilitate and render more uniform the supply of gas by wet gas-meters. For this purpose, the inlet-valve, in place of being applied direct to the float, is attached to it by leverage in such manner that, when the float rises and falls a short distance, the distance of motion of the valve is increased in proportion to the difference in the length of leverage employed. The float moves in a chamber sealed above the water-line from the inlet-valve, so as to have gaseous communication only with the measured gas-chamber.

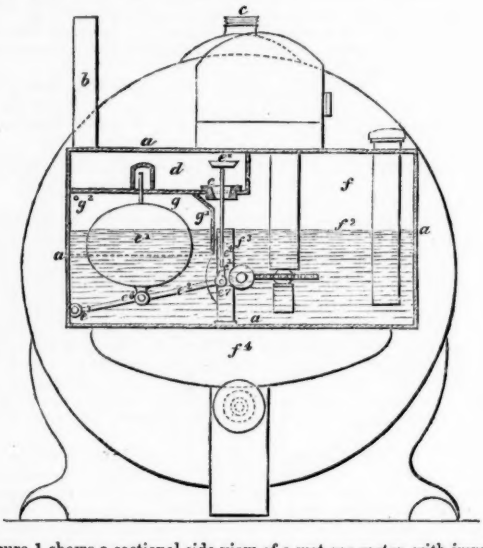

Figure 1 shows a sectional side view of a wet gas-meter, with improvements according to this invention applied to it; *a*, *a*, is the main framing of the meter; *b*, the inlet-passage for the unmeasured gas; and *c*, the outlet for the gas after being measured in its passage to be consumed. The gas entering by the passage, *b*, to be measured, first enters the chamber, *d*, thence through the valve-passage, *e*, to the chamber, *f*, from which it passes by an arm from the pipe, f^3, in the opening, f^1, to the measuring compartments. Water is supplied to the chamber, *f*, up to the line, f^2, and any excess passes away by the overflow-pipe, f^3, to the receiver, f^4, all which is well understood by persons acquainted with the construction of wet gas-meters; e^1, is the float regulating the extent of opening of the valve, e^*, and according to these improvements the valve, e^*, in place of being connected direct to the float, e^1, is attached to it by means of the lever, e^2, one end of which is supported so as to turn in bearings, e^3, whilst its other end is by pin-joint, e^7, connected to the stem, e^4, of the valve, e^*, and the float, e^1, is connected to the lever, e^2, by pin-joint at e^6, whilst its upper end has a stem, by which it is guided in its motion as shown.

By these means, it will be seen that when a variation takes places in the height of the water in the chamber, *f*, raising or lowering the float, an increased amount of motion will be imparted to the valve, e^*, proportionate to the relative difference in the distance of the points, e^3, and e^7, from the point, e^6, which may be varied.

The upper portion of the float moves in the chamber, *g*, which is sealed off from the chamber, *f*, to below the water-line, by a partition, g^1, and the gaseous communication to this chamber, *g*, is alone by a passage, g^2, with the chamber containing the measured gas.

The patentee wishes it to be understood that he does not confine himself to the precise details shown, so long as the peculiar character of the invention be retained, substantially as explained.

1204.—Rudolf Zimara of St. Petersburgh, Russia, engineer, for "*Improvements in stoves for heating and ventilating buildings.*" Patent dated April 24, 1862.

This invention has for its object improved arrangements of the fire-places, flues, and air-passages of stoves for the purpose of heating and ventilating buildings.

It is well known that in heating atmospheric air for the purposes of warmth and ventilation, by causing it to pass in contact with heated metal-surfaces, as at present commonly practised, that the air so heated is greatly deteriorated in quality; and one of the principal objects of these improvements in stoves is so to construct and arrange the flues and air-passages thereof that the air, in its passage to the interior of the building, may be heated by passing through a series of pipes or passages, composed entirely of earthenware.

The following is a description of the manner in which the patentee prefers to construct a pneumatic stove or heating apparatus, according to this invention, although he does not confine himself to this particular arrangement:—A suitable furnace or fire-place, with fire-bars and ash-pit closed by doors, is built and lined with fire-brick or fire-clay, for the combustion of the fuel. The heat and products of combustion pass over a bridge or partition, and then descend and pass underneath another partition, so as in a great measure to consume the smoke. The heat and products then ascend, and pass to and fro, or in a zig-zag form, through a series of horizontal and vertical flues or pipes, constructed entirely of earthenware, and thence away to the chimney.

Around and in contact with these heated flues or pipes, a series of passages are arranged, which communicate with the external air and the interior of the building where heat and ventilation are required. The furnace or fire-place, together with the series of flues and air-passages, are enclosed by brickwork, placed by preference in the basement of the building; and the atmospheric air, heated in its passage through the earthenware air-passages, is conducted by pipes or passages and introduced by suitable outlets into the several chambers of a building as required. Suitable pipes or passages are arranged for conveying the foul or vitiated air away from the interior of the building, and conducting it into the ash-pit of the furnace or fire-place, so as to create a continuous current, By this arrangement of heating and ventilating apparatus, great economy of fuel is obtained.

The claim is for the arrangement and construction of stoves composed entirely of brick and earthenware, for the purpose of heating and ventilating buildings as herein described.

1231.—Squier Cheavin and George Cheavin (his son), both of Boston, Lincolnshire, for "*Improvements in filtering and purifying water, and in apparatus employed therein.*" Patent dated April 26, 1862.

This invention has for its object improvements in filtering and purifying water, and in apparatus employed therein, and is based upon a patent, dated Dec, 5, 1853, No. 2820, granted to one of the inventors, for "*A double-action or belt-filter,*" and the construction of this filter was fully described in the specification of the said patent. The filter, as there described, has a bowl or vase at the top; this, in practice, it is found difficult to construct; according to the present invention, this bowl is not employed, but, in place thereof, the body of the filter (which may be cylindrical, or of other form) is carried up higher than before, and the upper part thereof employed in place of the bowl, this portion being divided off by a partition, through which passes the small perforated cylinder employed as before, to contain sponge or similar material. Around this small cylinder the filtering or purifying material is packed, with which the water first comes in contact, and below this there is, as before, another bed of filtering material, contained between two perforated plates; and for facility of renewing this material, as well as to facilitate the original construction of the filter, we make the central portion of the exterior vessel where this filtering-bed comes, separate from the upper and lower parts of the same vessel; the parts fit together with flanges, and are secured by screws or bolts; this arrangement allows of ready access to the filtering material. In order to cleanse the filter from time to time, when it is not necessary to change the filtering materials, a plunger or piston is introduced into the inner perforated cylinder, and worked up and down as a pump; to facilitate this, the exterior vessel is arranged so that a lever like a pump-handle may be connected with it by a pin or axis, and to this lever the rod of the piston or plunger is also jointed; this method of cleaning is more especially applicable to filters of large size; there is a passage made for the escape of the water employed in cleaning at a point over the filtering-beds, as well as below, as is described in the said former specification. In filters or purifiers of large size, several of the inner perforated cylinders may be employed. For the purpose of filtering and purifying water in this and other apparatus, coal is employed, either prepared by washing it with acid, or otherwise.

In preparing coal to be used in apparatus, such as above described, and otherwise for purifying water, it is preferred to take the description of coal known as pit coal or hard coal, and, by crushing and sifting, it is obtained in grains, without either dust or large pieces; these grains are thoroughly washed in water, rendered acid by means of sulphuric acid; the acid water is allowed to stand in contact with the coal for about half an hour, the whole being stirred up from time to time; afterwards, the acid water is run off, and the coal washed with water. Although it is preferred to employ acid to wash the coal, this is not essential; water only may be employed, and it should be remarked, that the purifying water, by causing it to percolate through granulated and washed pit coal, is an important feature in this invention.

1234.—Herbert William Hart, of Higher Broughton, Manchester, Lancashire, engineer, for "*Improvements in the manufacture of reflectors and shades for gas and other lights.*" Patent dated April 26, 1862.

This invention relates to reflecting-shades for gas and other lights, and consists in the application of a metallic surface to paper or cardboard, the metal forming the reflecting medium or surface, while the paper-stuff forms the body of the shade. These are generally prepared of a trun-

cated, conical form, and the metal surfaces are applied thereto, either in the form of thin tin or other reflecting metal foil, which may have been previously prepared and applied on thin paper, as well understood in preparing metal-foil papers.

Instead of forming the shade first, and then applying the metal-foil or foil-paper surface, it may be applied in the flat on paper or cardboard, and subsequently cut and converted into the form of shade desired. This paper-foil reflector may also be applied to the reflection of light generally, adapting its form to the purpose desired.

For reflectors for billiard-table lights, the patentee adopts the same form of shade usually adopted for the green paper shades used for such purposes, the only difference being that the improved shade presents a metal-foil surface as the reflecting surface, instead of the white paper as usual.

For some purposes, the cone of the shade may be much flatter than that of the shades above mentioned, as for shop-windows, when the light is to be more diffused, or even entirely flat; when such shades are flat in their general contour, it is preferred to make the reflecting surface of a series of facets, which can be effected by embossing or pressing, as well understood as applied to paper. This facet-surface is best adapted for the reflection of daylight, and is adopted by the patentee when used for that purpose. When used for daylight reflectors, the paper body and metallic surface must be carefully protected from the weather.

The claim is for the application of paper having a metallic reflecting surface, for the manufacture of reflectors and shades for gas and other lights, as hereinbefore described.

1248.—James Eglinton Anderson Gwynne, of Essex Street Wharves, Strand, London, W.C., engineer, for "*Improvements in the construcion of centrifugal pumps, and in the application thereof, parts of which improvements are also applicable to other pumps.*" Patent dated April 29, 1862.

This invention relates chiefly to improvements in the construction and arrangement of centrifugal pumps, and in their application to new and useful purposes.

In one modification, the improvements in the construction of the discs or revolving wheels of centrifugal pumps consist in the arms or plates being curved forward at the centre of the wheel, where they meet the entering water, tapering towards the shaft in the form of a screw, and inclined backwards where they approach the periphery or circumference—*i.e.*, curved from the direction of rotation.

In another modification, the arms are sloped or inclined at a tangent to the central boss, and are curved off at or near the circumference. These two improved discs are best adapted for raising or forcing fluids to comparatively low lifts. For high lifts or great pressures, the plates or arms are made either straight or slightly curved throughout their entire length; and of a sharper curve at their extremities as they approach both to the centre and the circumference. But the curves in this instance are turned in the opposite direction to those previously described—in other words, they are curved towards the direction of rotation.

The bosses or centres of these improved discs are strengthened by increasing their diameters at the middle, and also by carrying the plates downwards from the direction in which they revolve. This does not in the slightest degree interfere with the entrance of the water; and, at the same time, gives increased strength to the disc.

The cases or receivers of the pumps are constructed so as to give to the water-ways a gradually-increasing area from the top or division-plate, which is inserted to prevent any rotation of the fluid in the pump-case. This plate is constructed of a curved shape, so as to give the entrance of the discharge-pipe a bell-mouthed form. A passage is formed, for the escape into the discharge-pipe of any air or gas that may gather in the upper portion of the pump-case, where the sides of the case meet inside the suction-pipe. These are constructed with a sharp or knife-edge, so as to offer no resistance to the entering water or fluid. The suction and discharge-pipes are arranged in various ways; and the pumps are also adapted to be worked by one or more pulleys. On the revolving-shaft on which the disc is keyed, adjustable collars, rings, washers, or other contrivances, are fixed for balancing and compensating the wear in the disc or case of the pump.

The improvement in lubricating the bearings of centrifugal or other like pumps is effected by allowing a small quantity of the fluid which the pump is raising, and which can be graduated by a cock, to drop on the bearings and gland; and a filter is provided, through which the fluid can be first passed, if desired, before going to the bearings. There are also tubes for conveying the waste fluid to its original source; so that no loss or inconvenience can arise.

1282.—Alfred Henry Fielden, of 35, Castle Street, Holborn, London, W.C., commercial traveller, for "*Improvements in show-jars, lamps, signals, and light-houses, and other methods of illumination.*" Patent dated April 30, 1862.

This invention, so far as it applies to lamps, signals, light-houses, and other methods of illumination, consists in the use of glass-rods or tubes, bent or straight, and either white or coloured, or of white glass filled with coloured liquids, and so disposed or arranged as to admit of the said tubes or rods being illuminated inside the circle formed by them, or by means of light reflected through them—the nature of the colours employed, or the disposition of the tubes, at once deciding the position or character of the light-house or signal.

1284.—Henry Willis, of Albany Street, Regent's Park, London, N.W., organ-builder, for "*Improvements in valves, for the supply and discharge of gaseous bodies.*" Patent dated April 30, 1862.

The object of this invention, is so to construct the valves suitable for opening and closing passages for the supply and discharge of air, and other gaseous bodies, that the pressure of such air or gas will not interfere with the free action of the valve, whether closed or open. To this end, it is proposed to apply the principle of buoyancy for keeping the valve to its seat.

In adapting this improved buoyant valve to gas-regulators, the object is effected in the following manner—Kidder's gas-regulator, a modification of which is the one preferred, consists mainly of two castings, one of which, besides containing an inlet and outlet-passage for the gas, is fitted with three annular channels for receiving mercury, or other suitable fluid. The other is a cylindrical casting, which serves as a guide for the stem of the regulator, and also forms a seat for the buoyant valve. This valve consists of an open cylinder, and is connected, by arms, to the stem of a bell or inverted cup, so that both bell and valve rise and fall together. The bell is weighted so as to regulate the flow of gas through the aperture whatever the pressure, at which it is supplied according to the well-known principle of action of Kidder's gas-regulator. The second cylinder is placed in the channel, the mercury in which seals the joints. The bell dips into the mercury, in one of the annular channels, and the valves dip into the mercury in the outer channel. When the gas is turned on from the main, and none is being burned, the upward pressure of the gas upon the bell will close the valve. When, however, a supply of gas is required, and a vent is opened for the gas, the bell will descend, and open the valve, which will, however, throttle the central opening in the cylinder to the required extent, to ensure an equable pressure at the burners.

Although this buoyant valve is capable of very wide application, yet it is not proposed to employ it where heavy pressure—such as steam-pressure—is required to be resisted, as the depth of the mercury would, in such cases, be excessive.

1285.—William Edward Newton, of 66, Chancery Lane, London, W.C., civil engineer, for "*Improvements in lamps.*" A communication. Patent dated April 30, 1862.

This invention of improvements in lamps relates to a new mode of securing the chimney to the cone, and of securing the cone to the burner, whereby the chimney is allowed to expand as it becomes heated, and is thereby prevented from breaking or fracturing, a result which would occur if a rigid or unyielding chimney were employed. The invention, at the same time, admits of the cone being firmly secured to the burner, and serving as a handle to allow of the chimney and cone being removed from the burner while hot.

To the base of the cone, which fits loosely on the burner, there is attached a radial arm, which projects upwards a suitable distance from the cone, and passes through, or is fitted in a recess in the top of the burner. To the outer end of this arm, and on its upper surface, there is, secured by a rivet, an elastic plate, which is equal in length to the arm, and is curved slightly upwards at its inner end. This plate is allowed to turn easily on its rivet, and, when in use or performing its proper function, this plate is also fitted in the recess of the burner, and is, consequently, directly over the arm of the cone. To the base of the cone, and at the side opposite to the arm, there are attached, or formed, two hooks, which are designed to catch over the flange at the lower end of the glass chimney, and this flange also fits underneath the inner end of the elastic plate, between it and the arm. This elastic plate presses down on the top of the flange, and, in connexion with the hooks, firmly secures the chimney to the cone. The plate admits of the chimney freely expanding while heating, as the flange of the chimney, when the latter expands, merely extends or spreads outward underneath the plate, the side of the chimney not being allowed to come in contact with the inner end of the plate.

APPLICATIONS FOR LETTERS PATENT.

3206.—John Campbell Robertson, of Gracechurch Street, London, E.C., and William Cornwell White, of King Street, Regent Street, London, W., for "*An improved tap or cock.*" Nov. 29, 1862.

3228.—William Clark, of 53, Chancery Lane, London, W.C., for "*An improved apparatus applicable as a pump, water-meter, hydraulic meter, or a steam-engine.*" A communication. Dec. 1, 1862.

3245.—William Henry Browne, of 29, Alwyne Road, Canonbury, London, N., for "*Improvements in gas-stoves.*" Dec. 3, 1862.

3253.—Frederick Daniel Delf, of Liverpool, Lancashire, chemist, and Thomas Cummings Gibson, of Ramsey, Isle of Man, gentleman, for "*Improved means and apparatus, whereby petroleum and other oils and hydrocarbons can be safely carried and stored.*" Dec. 4, 1862.

3266.—Phineas Cowan, of the firm of L. Cowan and Sons, of Hammersmith Bridge Soap-Works, Barnes, Surrey, manufacturers, for "*An improved method of purifying gas.*" Dec. 5, 1862.

3291.—John Hillian, of Balsall Heath, Worcestershire, manager of works, for "*Improvements in ventilating, and in the exclusion of dust or draught, insects, or other animals from apartments, carriages, or other confined spaces.*" Dec. 8, 1862.

3302.—John Milne Syers and Edward Davies Syers, both of Liverpool, Lancashire, oil-merchants, for "*Improvements in deodorizing petroleum, shale, and other like oils.*" Dec. 9, 1862.

GRANTS OF PROVISIONAL PROTECTION.

3066.—Edmund Small Cathels, of Shrewsbury, Shropshire, for "*Improvements in apparatus used in the manufacture of gas.*" Nov. 14, 1862.

3082.—James Wilson, of No. 2, Royal Exchange Buildings, London, E.C., civil engineer, for "*Improvements in hydraulic-pumps.*" A communication. Nov. 15, 1862.

3085.—Christopher Binks, of Parliament Street, Westminster, London, S.W., for "*Improved methods of obtaining oxygen and chlorine gases.*" Nov. 17, 1862.

3093.—Jacques Arbos, of Barcelona, Spain, doctor, for "*Improvements in generating certain gases for lighting and heating, and in apparatus employed therein.*" Nov. 18, 1862.

3132.—Thomas Walker, of Birmingham, Warwickshire, engineer, for "*Improvements in utilizing sewage matters, and in the means or apparatus employed therein, part of which improvements are also applicable to raising and forcing other fluids.*" Nov. 21, 1862.

3157.—John Moule, of 15, Seabright Place, Hackney Road, London, N.E., manufacturing chemist, for "*An improved method of deodorizing mineral oils and hydrocarbons.*" Nov. 25, 1862.

3173.—William Austin, of Furnival's Inn Place, Holborn, London, E.C., for "*An improved material for the manufacture of cartridge-cases, applicable also for tubing and various other useful purposes.*" Nov. 26, 1862.

3178.—Frederick William Hartley, of 55, Millbank Street, Westminster, London, S.W., gas engineer, for "*Improved means of obtaining certain products resulting from the manufacture and purification of coal-gas.*" A communication. Nov. 27, 1862.

3206.—John Campbell Robertson, of Gracechurch Street, in the City of London, and William Cornwall White, of King Street, Regent's Street, London, for "*An improved tap or cock.*" Nov. 29, 1862.

NOTICES TO PROCEED.

2059.—George John Yates, of Liverpool, Lancaster, chemist, and John William Ward Tindall, also of Liverpool, chemist, for "*A process of deodorizing paraffin, coal, pitch, rock, and other like oils and hydrocarbons.*" July 19, 1862.

2140.—Henry Hedgley, of Great College Street, Camden Town, London, N.W., for "*Improvements in lamps.*" July 28, 1862.

2143.—Charles William Siemens, of 3, Great George Street, Westminster, London, S.W., for "*Improvements in gas-engines.*" July 28, 1862.

2199.—William Clark, of 53, Chancery Lane, London, W.C., for "*Improvements in the purification of water, and in apparatus employed therein.*" A communication. Aug. 5, 1862.

2391.—William Husband, of Hayle, Cornwall, for "*Improvements in water-valves.*" Aug. 28, 1862.

2887.—Frederick Lipscombe, of 233, Strand, London, W.C., water-filter manufacturer, for "*Improvements in purifying water.*" Oct. 27, 1862.

2961.—James Winter, the younger, of Wardour Street, Soho, London, W., for "*An improved safety-tap or cock, applicable to gas-burners, gas-pipes, and vessels containing gas, also water-pipes, steam-pipes, and vessels containing inflammable and other liquids, compressed air, and spirituous liquors.*" Nov. 1, 1862.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

2251.—John Dales, "*Improvements in applying deodorizing fluids, to sewers and other receptacles of sewage.*" Nov. 9, 1859.

2445.—John Zuill Kay, "*Improvements in gas-meters, and in apparatus for maintaining or preserving the levels of liquids.*" Oct. 26 1859.

2501.—Charles Bacon, "*Improvements in globes and shades for gas-lights, and oil, and other lamps.*" Nov. 3, 1859.

2505.—George Wemyss, "*Improvements in ventilators.*" Nov. 3, 1859.

2574.—Marc Antoine François Mennons, "*Improved apparatuses for the concentration, distribution, and application of the heat evolved by gas, oil, and other lamps.*" A communication. Nov. 14, 1859.

2587.—James Donald and Peter Smith, "*Improvements in apparatus for raising and for extracting liquids.*" Nov. 15, 1859.

2588.—Charles Chalmers, "*Improvements in gas-stoves for heating buildings, apartments, and other similar places.*" Nov. 15, 1859.

2607.—Richard Laming, "*Improvements in obtaining alkalies and alkaline compounds.*" Nov. 17, 1859.

2613.—James Pinchbeck, "*Improvements in consumers compensating gas-meters, which are partly applicable to ordinary consumers meters.*" Nov. 18, 1859.

2655.—Thomas Lister, "*Improvements in the construction of sanitary privies and water-closets, part of which improvements is applicable as a tap for drawing off liquids.*" Nov. 23, 1859.

2661.—James Fyfe, "*Improvements in apparatus for regulating and adjusting the flow and pressure of liquids.*" Nov. 24, 1859.

2669.—James Sim, "*Improvements in measuring and registering the flow or discharge of liquids.*" Nov. 25, 1859.

2700.—Leon Numa Dejean, "*Improvements in hydraulic-motive power.*" Nov. 29, 1859.

2708.—Edward Dorsett, "*A new manufacture of heavy oil.*" Nov. 30, 1859.

2764.—Ferdinand Potts, "*Improvements in the mode of manufacturing or finishing tubes, for certain purposes.*" Dec. 6, 1859.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

2657.—John Wilkes, "*An improvement or improvements in the manufacture of tubes of copper and alloys of copper.*" Nov. 26, 1855.

Legal Intelligence.

COURT OF QUEEN'S BENCH.

TUESDAY, Nov. 25.

(*Sittings in Banco—before Lord Chief Justice* Cockburn, *and Justices* Wightman, Blackburn, *and* Mellor.)

THE LONDON DOCK COMPANY *v.* THE PARISH OF ST. PAUL, SHADWELL.

Mr. Bovill, Q.C., Mr. Metcalfe, and Mr. Murphy, appeared for the appellants, and Mr. Lush, Q.C., Mr. Poland, and Mr. Bushby, for the respondents.

In this case, an appeal had been made against an assessment of the property of the company in the respondent parish to a poor-rate, and the matter was referred to arbitration, the submission containing a clause giving either party power to call upon the umpire to state a case for the opinion of the court upon any question of law which might arise. The umpire, however, was not asked to, and did not exercise this power. After the award was made, a correspondence took place between him and the appellants, who were dissatisfied with his decision, as to the principle upon which he had acted. Upon this the company obtained a rule to set aside the award or to send it back for revision, on the ground that it was based upon a wrong principle.

It appeared that in 1853 the London Dock Company obtained an Act of Parliament, under which they enlarged their docks considerably in the parish of St. Paul, Shadwell. The works took some years in constructioe, and during that time the parish could only assess the company at the same value that the property had been previously rated at. During this period, the parishioners had been heavily rated, and money had to be borrowed at 6 per cent. When the new works were completed, the parish proceeded to rate the company at the full value of that part of the docks which was in their parish, and, on October 30, 1860, they rated the company at a value of £30,000, which enabled them to relieve the other ratepayers, so that the rate was not collected on them. The company upon this appealed, and it was then agreed to refer the matter to two arbitrators, who had power to choose an umpire, and chose Mr. George Pownall. The submission to arbitration contained a clause giving power to the arbitrators or to the umpire on the application of either party to state a special case for the purpose of raising any question of law for the opinion of the court, but they had not been called upon by either party to exercise this power. The property of the company consisted of their docks, warehouses, roads, and necessary appurtenances distributed in different proportions in the parish of St. Paul and in adjoining parishes. On the 30th of July the umpire made his award, whereby he reduced the rateable annual value to £26,200; thus, reducing it by the sum of £3800. The company being dissatisfied with this award, on the 5th of August wrote, by their secretary, to the umpire, requesting him to state the legal principle upon which he had acted in making the award, in order that they might have an opportunity of taking advice upon the case with the view of questioning its validity in the Court of Queen's Bench, or in the Court of Quarter Sessions, in respect to future rates. To this communication the umpire replied as follows:—

Oct. 18, 1862.

In fixing the amount, I first ascertained and determined the value of the whole of the docks, being clearly of opinion that it could only be treated as a whole, and that no individual or company could be found to take any one part without being assured of having the remainder, assuming it belonged to different owners. Having ascertained the value of the whole, I then divided the value between the different parishes according to the area, precisely in the way I should have done if, instead of assessing the property for rating purposes, the docks had been the property of different owners, and I had been employed by those owners to determine the value of the whole for a reletting, and to settle the amounts to which they were severally entitled. (Signed) George Pownall.

Mr. Lush now showed cause against the rule on behalf of the parish, and said he was ready to argue, if necessary, that the principle upon which the umpire acted was right. But it was unnecessary to argue that; because a party to a submission could not complain of the conclusion of law or fact arrived at by the umpire when he had acted within his powers.

Justice Wightman referred to the case of *Jones v. Corry* (5 Bing, N. C.).

Mr. Lush said, in that case, the arbitrator had exceeded his powers. The court had never acted on subsequent letters written by the umpire.

Justice Wightman observed that it would have been more discreet in the umpire not to answer the letter addressed to him as to the grounds of his award.

Mr. Lush said, no doubt it would; but he was pressed to do so on the ground of the importance of the question with regard to future rates, and he had been advised, for that reason, to comply with the application.

Justice Blackburn said that, so far as he could see, the principle upon which the umpire acted was a right one.

Mr. Lush said, in the case of *Legge v. Young* (16 C. B., 626), the case of *Jones v. Corry*, referred to by Justice Wightman, was not cited, but it was in *Hodgkinson v. Fernie* (3 C. B., N. S., 189). The latter case decided that any error in the legal principle on which the umpire proceeded must appear upon the face of the award, or on some document forming a part of it. Here the letter of the umpire was no part of the award, and could not be made the ground for setting it aside, especially as the arbitrators and umpire had power to state a special case, in order to raise any question of law; and neither party had applied to them to do so, but each had taken the chance of the decision being in his favour. Now, one party sought to set aside the award, in order to raise a question of law for the court, which ought to have been done before.

Lord Chief Justice Cockburn said, the company were in this difficulty, that, even assuming there was a possible mistake, all the court could do was to send the award back to the umpire to state a case, and that might have been asked before the award was made. Instead of that, however, the company lay by, and took their chance, and then entered into a correspondence to obtain a statement from the umpire upon which to come before the court.

Mr. Bovill said, the umpire's letter was written with the intention of raising the question of legal principle, and the whole object of the parties was to get that point settled with a view to future rates.

Lord Chief Justice Cockburn said the proper course for the company to have taken, in order to effect that object, was to apply to the umpire to state a case. What was the use of inserting a clause of that nature in the submission providing for the statement of a special case, and then treating it as nugatory? The company had not taken the course which was open to them, but they now sought to inflict additional expense on the opposite side, in order to obtain what they might have obtained before. Besides, he doubted the propriety of asking an umpire for his reasons, for the purpose of taking the opinion of the court.

Mr. Bovill admitted that there would be no answer to the observation, that the appellants were now too late, had it not been for the letter of the umpire, which was evidently written with the very object of raising the question of legal principle for review, and which disclosed that he had gone upon a wrong principle—that of area—according to which the company would be rated several times over in different parishes for the same property. It was not possible to apportion the rateable value by area alone. He would put the supposition that in one parish, where there was half the area, there were no warehouses, and that in the parish in which the other half of the area was situated there were all the warehouses, if the annual value of the whole was £50,000, then, according to this principle, of taking the area as the basis of assessment, the company would be rated at £25,000 in the parish in which they possessed no rateable property at all. This was so grossly erroneous, that it could not stand; and an award might be set aside, or sent back for review, upon a manifest error admitted by the arbitrator. The cases which had been cited did not touch this case.

Lord Chief Justice Cockburn observed that they appeared to go the length of saying that the collateral paper must have been treated as part of the award.

Mr. Bovill said this case was a great deal stronger than that of *Jones v. Corry*. That case, and *Kent v. Elstob* (5 East, 13), established an exception to the general rule; and both were recognized as authorities in the case of *Hodgkinson v. Fernie*.

Lord Chief Justice Cockburn said he thought there was as much doubt about *Legge v. Young* as about *Jones v Corry*.

Justice BLACKBURN said, Mr. Justice Williams, who was counsel in the latter case, did not seem, in his judgment in *Hodgkinson v. Fernie*, to approve of the decision. He seemed to think *Kent v. Elstob* good, and *Jones v. Corry* bad law.

Mr. BOVILL said the parties in the present case wished to have the whole matter brought before the court, and the principle settled.

Justice WIGHTMAN: You want a special case?

Mr. BOVILL: Precisely so; the umpire has not disposed of the appeal.

Justice WIGHTMAN: Then, why did you not ask for a case before?

Mr. BOVILL: Because we thought the umpire would decide properly. (A laugh.)

Lord Chief Justice COCKBURN: That is, you took your chance of the decision being in your favour; and, when it is not, then you desire to get rid of it on a question of law, which you might have raised before, but did not. It would be very mischievous if, when there is this salutary provision on the agreement of reference, enabling the arbitrator, if desired, to state a case, to raise a question of law, we should allow one of the parties, after taking his chance of a decision in his favour, without asking the arbitrator to exercise that power, then afterwards to upset the award, in order to raise a question of law which he did not choose to raise before.

The other judges concurred, and the rule was accordingly discharged.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

CITY COURT OF SEWERS, GUILDHALL, TUESDAY, DEC. 2.

At the Meeting of the Commissioners this day—Mr. DE JERSEY in the chair—

Mr. DAW, the chief clerk, read a letter from Mr. Secondary Potter (solicitor *pro tem.*), accompanying the shorthand-writer's notes of the judgment delivered in the Exchequer Chamber, in the case of the *Great Central Gas Company v. Clarke.*

Deputy ELLIOTT inquired, whether the chairman could give the commission any idea of what the costs connected with that case would be?

The CHAIRMAN said, that would be impossible; it would take a conjuror to do that.

Deputy ELLIOTT asked, whether the bill of costs had not been sent in?

The CHAIRMAN said, it was not usual with solicitors to send in their bills while a cause was pending. It was open to the commission to take this matter up to the House of Lords.

Mr. YOUNG moved—"That the letter be referred to the committee, to see what further steps should be taken in the matter."

Dr. ABRAHAM seconded the motion, although he thought it probably would not be wise, after the adverse decision of two courts, to prolong the litigation. He believed the commission had done their duty in the steps they had hitherto taken to ascertain the legal rights of the citizens, and nothing would induce him to advise the court to prosecute the case further. After the first decision, their legal officers expressed themselves so strongly in favour of an appeal to a Court of Error, that they would not have been justified in the eyes of their constituents if they had not raised the question in the Exchequer Chamber. He commented rather warmly upon the absence of the Recorder and Common Serjeant at the argument on the case, and on the fact that the commission were only represented by the junior counsel, Mr. Pollock. On this account, he recommended that the reference should be made to the committee, in order to ascertain whether the result of the cause was attributable to the want of legal advocacy.

The CHAIRMAN said it was usual, upon appeals to the Court of Error, for only one counsel to be heard on each side. Referring to the accounts of the late solicitor, he said he found several items of payment made to Mr. Bovill and the Recorder, as consultation-fees, so that it would appear that Mr. Pollock had had the advantage of their advice in the matter. He had since seen the latter gentleman, who still expressed an opinion that the judgment was founded upon a wrong interpretation of the clause in the Act, but did not think there was any chance of obtaining a reversal by carrying the question to a higher court.

The motion was then put, and carried.

Mr. HAYWOOD laid before the commission the three following specifications for contracts for lighting the public lamps from the 1st of February next, and suggested that Tuesday, the 16th inst., should be appointed for receiving tenders, which was agreed to:—

SPECIFICATION *of the Conditions of Contract for the Supply of Gas to the Public Lamps within the Southern District of the City of London for a term of one year from February* 1, 1863.

The Commissioners of Sewers of the City of London will receive tenders for the supply of gas to the public lamps within the southern district of the City for a term of one year from February 1, 1863.

The plan of the district may be seen at the office of the engineer. The number of lamps is 1772.

The whole charge of the pipeage from the ground line to the burner, and the lighting, extinguishing, and entire care of the lamps and fittings will be assumed by the commission. The company will have to supply a proper quantity of gas, and nothing more.

The gas is to be the common gas of the quality prescribed by the Metropolis Gas Act, 1860; and nothing herein contained is to deprive the commission in respect of price of gas, nor in any other respect of the guarantees and benefits conferred upon local boards by the said Act, and the Acts incorporated with it.

The quantity required it is expected will be about 3 cubic feet of gas per hour at each lamp between sunset and sunrise throughout the year, but the commission is to be at liberty to consume any quantity not exceeding 6 cubic feet of gas per hour, nor less than 2 cubic feet of gas per hour.

A meter is intended to be affixed to each lamp, and the gas company contracting to supply the gas is to appoint an officer, who, with an officer or agent of the commission, shall read off the indices of the meters once each quarter, and as nearly as possible to each quarter day. The quantity registered by the meters shall be the quantity to be charged in the account then due. But, at the last quarter of the contract, the readings shall all be taken before, but as near as possible to the day of the expiration of the contract, and a fair and proportionate allowance shall be made per lamp for the quantity of gas which may be consumed between the date of the reading of any one meter and the day of the expiration of the contract.

Should the commission be unable to affix all the meters by the 1st of February, 1863, it shall nevertheless light and take charge of the whole of the lamps to which meters may not be affixed, and the quantity of gas consumed at each of those lamps without meters shall be as near as possible the same quantity as shall be consumed at those with meters, and the quantity to be estimated and allowed for until the time when the meters shall be all affixed shall be computed upon such basis; and, in the event of any dispute arising as to the quantity, the matter shall be referred to the engineer to the commission and the engineer to the gas company, and, should they be unable to agree, it is to be referred to another engineer, whose decision as to the amount of gas to be charged for shall be binding, final, and conclusive.

The bills are to be made out quarterly, and in such form as the engineer to the commission may direct, and will be paid upon his certificate as to their correctness.

The tenders are to be at per 1000 cubic feet of gas supplied, and a proportionate for any less quantity than 1000 cubic feet.

The tenders are to be sealed up and endorsed upon the outside, "Tenders for the Supply of Gas to the Public Lamps within the Southern District of the City of London," and be delivered at the office of the clerk to the commission on or before 12 a.m. on Tuesday, the 16th of December, 1862.

December, 1862.

SPECIFICATION *of the Terms of Contract for Supplying with Gas, Lighting, and Maintaining the Public Lamps within the Northern District of the City of London, for a Term of One Year, from the 1st of February*, 1863.

The plan of the district may be seen at the office of the engineer. The number The company agreeing to light the public lamps, shall at their own costs and charges, to the satisfaction of the engineer and surveyor for the time being of the Commission of Sewers of the City of London, or any other officer to be appointed by them for superintending the lighting of the said district, or any part thereof, for and during the term contracted for, light with gas all the public lanterns which are now or may hereafter be set up or affixed within the district tendered for, every night at or before sunset in each day, and continue them lighted until at or after sunrise in the following day, at the tendered amount per light per annum that may be agreed upon between the company and the commission.

The burners for lighting the public gas-lamps are to be of the description commonly known as bat's-wing; their consumption is not to be less than 5 cubic feet per hour; and the gauge of the burner is to be such that, with the cocks turned full on, and under a pressure of gas of 5/10ths of an inch, the quantity of 5 cubic feet of gas shall pass through them per hour.

The flames when consuming the specified quantity are to be regular, and nearly level at the top; and the commission shall have full power to affix meters, remove burners from time to time from the lamps, or adopt any means that may appear to them necessary either to test the pressure or the size of the burners, and enable them to see that the stipulated quantity of gas is supplied to the public lamps.

The commission will, at their own cost and charges, erect and maintain the posts, columns, and brackets; but all the mains, pipes, services, stop-cocks, plugs, tubes, burners, and other apparatus required for lighting the lanterns, shall be from time to time supplied and affixed by the company, at their own costs and charges; and the company shall keep the main-pipes and services constantly clear for the passage of the gas through them; and also shall once in every week, or more frequently if the engineer and surveyor, or other officer, shall think it necessary, cause the lanterns and burners to be well and properly cleaned, so that a steady and uniform light be at all times maintained; and all such cleansing is to be done under the direction and to the satisfaction of the engineer and surveyor, or other officer of the commission; and the company shall, at their own costs and charges, fix and provide all labour and materials which may be necessary or required for such purposes.

The company shall, at their own costs, repair and amend, to the satisfaction of the engineer and surveyor to the commission, all the lanterns, frames, and glass, main-pipes, services, stop-cocks, plugs, tubes, burners, and apparatus, throughout the various streets and places, as shall be broken or damaged, within twenty-four hours after such breakage.

The company shall, at their own costs and charges, once, at least, during every twelve months paint, in a workman-like manner, twice over with good oil-colour all the lantern-irons and lantern-frames; and such painting shall be performed between the 25th day of June and the 28th day of September in each year, such painting to be done under the direction and to the entire satisfaction of the engineer and surveyor for the time being to the commission; and notice shall be given in writing to the surveyor by the company when the company intend performing this portion of their contract.

The commission shall be empowered, at any time during the term of the contract, to direct that the use of any of the service-pipes, cocks, burners, and apparatus now set up, laid down, or affixed for the supply of gas to the public lanterns, within the said district, shall be discontinued, and the company shall, thereupon, at their own expense, cause the same to be removed, and, in case the company shall neglect to remove the same within three days after notice to that effect, the commission shall be at liberty to remove the same, and charge the expense of such removal to the company.

In the event of the commission discontinuing any existing lamp between any of the usual quarter days, the amount that shall be allowed to the gas company for lighting the lamp from the previous quarter day shall be determined by the engineer and surveyor to the commission, and, in the event of any additional lamps being set up, the amount to be paid for the lighting during the period between the first time of lighting and the quarter day next ensuing, shall be determined by the engineer and surveyor to the commission, after which time the lamp is to be paid for at the same rate per quarter as the other lamps, and, in all such cases, the award of the engineer and surveyor shall be final and conclusive.

The gas supplied by the company, for lighting the public lamps, shall be common gas, of the quality and illuminating power prescribed by the 25th section of the Metropolis Gas Act, 23 and 24 Vict. cap. 25.

If the said company shall, from wilful neglect or any other cause, fail to comply with the provisions of this contract, it shall be lawful for the commission, upon breach or non-performance by the company of any agreement hereinbefore specified, or understood, to employ or contract with any other company or person for lighting with oil or gas, or in any other manner, all, or any of the streets and places, and the company shall reimburse to the commission such sums of money as they shall pay, or be liable to pay under any contracts that may be entered into by them in pursuance of this provision, and shall pay and discharge all fines and penalties to which the company shall be subject, as well as all costs, charges, and expenses which the commission may incur or sustain, by reason of any such breach or non-performance of their contract.

All the fines and penalties, hereinafter specified and described, which may be imposed from time to time upon the company shall be considered as liquidated damages, and the same, together with all other sums of money which may be payable to the commission by virtue and under the clauses of this specification, shall be paid by the company to the clerk, for the time being, of the commission, at the office of the commission, in the Guildhall, of the City of London, and in case of non-payment of any such fines, penalties, and sums of money, it shall be lawful for the commission to deduct and retain the amount out of the moneys which shall become payable by the commission to the company for lighting the public lamps within any portion of the City, and in case the same shall exceed the moneys which shall become payable to the company, then such excess may be recovered by the commission as the law directs.

The company shall save harmless, and keep indemnified the commission from all costs, charges, damages, and expenses which they may sustain or incur by reason of any breach, neglect, or default of the company in any of the covenants and provisions hereinbefore contained, and from and against all actions, suits, claims, and demands which may be commenced, prosecuted, or made against the commission in respect of any accident or injury that may arise by reason of the extinction of any of the lights in the said streets or other places, or from any other causes whatsoever arising out of or connected with the lighting of the public lanterns, contracted for, or on the supply of gas for the same.

The company agreeing to light the public lamps shall not be permitted to assign, or otherwise dispose of or part with, the contract to any other company or person whomsoever, without the consent of the Commissioners of Sewers, signified in writing under the hand of their clerk; or, if the company lighting the public lamps within the City shall be guilty of any wilful breach or non-performance of any of the covenants and provisions herein contained, it shall be lawful for the commission, if they shall think proper so to do, to determine and put an end to the contract upon the expiration of fourteen days, after notice in writing, under the hand of their clerk for the time being, shall have been to given to said company, and, in such case, the contract, and all the covenants and agreements therein contained, shall thenceforth cease and be absolutely null and void, to all intents and purposes whatsoever. Nothing herein contained shall be held to deprive the commission, in respect of price for gas supplied, of the benefit conferred by clause 37 of the Metropolis Gas Act of 1860, nor in any other respect of the guarantees and benefits conferred upon local boards by the said Act and the Acts incorporated with it.

The payments will be made by the commission to the company quarterly, and the company is to make out the bills for the lamps in such form or manner as the commission may require.

The commission will not bind itself to accept the lowest or any tender.

Tenders are to be sealed up, and endorsed upon the outside, "Tenders for lighting and supplying gas for the public lamps within the northern district of the City of

London," and be delivered at the office of the clerk to the commission, on or before twelve A.M., on Tuesday, the 16th of December, 1862.

Penalties.

In the event of its being satisfactorily proved to the commission that, in any of the particulars hereinafter mentioned and described, the contract has not been complied with, the company is to forfeit and pay to the commission the following sums of money :—

	£	s.	d.
For allowing burners to be fixed or remain, which, under the given restrictions, do not consume, upon the average of one night, the prescribed number of cubic feet of gas per hour—for every offence	20	0	0
For supplying gas inferior to the prescribed standard of illuminating power—for each offence	100	0	0
And, in addition thereto, a sum of £10 for every day, after notice in writing from the authorized officer of the commission, during which the gas shall so continue below the standard.			
For every time that a lantern-glass, service-pipe, or stop-cock shall not be repaired within twenty-four hours after it has been damaged or broken	0	10	0
For not duly cleansing the lanterns or burners—for each lantern or burner, per night	0	2	6
For not supplying each burner with the full quantity of gas, or for not maintaining the lamps properly lighted for the full time specified between sunset and sunrise—for each burner, per night	0	10	0
For ditto, ditto, ditto, if 5, or more than 5, lights in any one street or place—for each offence	0	10	0
For not painting the lanterns within the time and in the manner specified—per lantern	0	10	0

SPECIFICATION *of the Conditions of Contract for Lighting and Extinguishing the Public Lamps, for Cleaning, Painting, and Repairing the Lanterns, for Repairing and Keeping Clean and Clear the Pipeage and Fittings from the Ground Line to the Burner, for Supplying the Naphtha and Filling the Carburators to the Lamps, within the Southern District of the City, for the Honourable the Commissioners of Sewers of the City of London, for a term of One Year from February* 1, 1863.

The plan of the district is attached ; the number of lamps is 1772, of which about 529 are upon columns and 1243 upon brackets. The contractor is, however, to take his own observations upon these points, as the commission only guarantee the number of lamps to be lighted.

Lamps to be Lighted from Sunset to Sunrise.

1. The contractor agreeing to light the public lamps is, at his own costs and charges, to the satisfaction of the engineer and surveyor for the time being of the Commissioners of Sewers of the City of London, or any other officer to be appointed by them for superintending the lighting of the said district of the City, or any part thereof, for and during the term contracted for, to light all the public lanterns which are now or may hereafter be set up or affixed within the district tendered for, every night at or before sunset in each day, and maintain them lighted until at or after sunrise in the following day at the tendered amount per light per annum that may be agreed upon between the contractor and the commission.

Burners to be employed.

2. The burners for lighting the public gas-lamps are to be of the description commonly known as bat's-wing, and to be such that with the cocks turned full on and under a pressure of gas 5/10ths of an inch, the given quantity of gas shall pass through them ; the flame is to be regular and nearly level at the top ; and the commission shall have full power to remove burners from time to time from the lamps, or adopt any means that may appear to them necessary to test them. Should the burners at present upon the lamps not be in accordance with this description, the contractor is to provide and fix new ones within 3 days after the 1st of July 1863, and supply and fix others from time to time as may be required during the whole time of this contract, and leave the same in good condition at the expiration of the contract.

3. The contractor shall abide by the regulations which from time to time shall be given to him by the engineer of the commission as to the amount of gas to be consumed per night, and shall not, in any instance, allow the burner to consume more than such quantity upon an average during the hours of burning.

4. The tap on the top of the carburator and beneath the burner is that which is to be opened and shut daily by the lamplighter, but the lower tap and all joints, junctions, and other parts of the pipeage are to be kept entirely free from leakage.

Contractors Notice and Report of Defective Lighting.

5. The contractor shall send to the office of the engineer of the commission daily at eleven o'clock A.M , and copy the returns of defective lighting observed by the police on the previous evening, and shall immediately attend to the same, and shall return to the engineer the following day his report as to the cause of the complaint, and, if the defect be found to be attributable to the gas company, he shall immediately give notice to them. A printed form for these purposes will be supplied to the contractor.

Notice of any Damage to the Property of Commission.

6. He shall also give notice in writing to the engineer of the commission if he should observe anything wrong either in meter, lamp-post, or any property belonging to the commission.

Repairs of Fittings, Lanterns, &c.

7. The commission will, at their own costs and charges, maintain the posts, columns, and brackets, but all the service-pipes, stop-cocks, plugs, tubes, burners, and other apparatus required for lighting the lanterns from the ground-line to the burner shall be maintained in a good serviceable condition by the contractor at his own costs and charges, and he shall keep the pipes and services within those lengths constantly clear for the passage of the gas through them, and also shall once in every week, or more frequently if the engineer and surveyor or other officer shall think it necessary, cause the lanterns and burners to be well and properly cleansed, so that a steady and uniform light be at all times maintained, and all such cleansing is to be done under the direction and to the satisfaction of the engineer or other officer of the commission ; and the contractor shall, at his own costs and charges, find and provide all labour and materials which may be necessary or required for such purposes.

Reparations.

8. The contractor shall, at his own costs, repair and amend, to the satisfaction of the engineer and surveyor to the commission, all the lanterns, frames, and glass services, stop-cocks, plugs, tubes, burners, and apparatus throughout the streets and places as shall be broken or damaged within twenty-four hours after such breakage, and all loss of gas that may occur thereby shall be paid for by him, and all losses of gas that may be proved to have taken place through the imperfect state of the pipe and fittings generally, and which may have thereby to be paid for by the commission, shall be repaid to the commission by him.

Painting.

9. The contractor shall, at his own costs and charges, once at least during the year, paint in a workmanlike manner twice over with good oil-colour, all the lanterns, irons, and lantern-frames ; and such painting shall be performed between the 25th day of June and the 28th day of September ; such painting to be done under the direction and to the satisfaction of the engineer and surveyor for the time being to the commission.

Carburators to be Maintained and Filled.

10. The contractor shall, at his own costs and charges, maintain the carburetting apparatus, as fixed to all or any of the public lamps, and shall, at his own cost, supply the naphtha, and fill the carburators at least once weekly, or more frequently if required so to do ; and at all times maintain them sufficiently full of naphtha of such quality as shall increase the illuminating power of the gas, so that 3 cubic feet of naphthalized common gas, burned in a bat's-wing burner, shall give continuously a light equal to that of 5 cubic feet of the same gas not naphthalized, burned in a similar manner—the gas being common gas, of the quality prescribed by the Metropolis Gas Act, 1860.

It is stated, for the information of the contractor, that it is estimated the quantity of naphtha which each carburator will require annually is from 2¼ to 2¾ gallons ; but the contractor must supply the proper quantity, however much that may be.

Quality of Naphtha.

The naphtha shall be colourless. Its specific gravity shall not be less than 850 nor greater than 870 (water being equal to 1000). Its boiling-point shall be 230 degrees of Fahrenheit ; and, when distilled from a glass vessel, placed in an oil-bath, and having a thermometer in the naphtha, it shall yield 70 per cent. of naphtha between the temperatures of 230 degrees and 266 degrees of Fahrenheit, and 20 per cent. between 266 and 300 degrees of Fahrenheit—that is, 90 per cent. of the naphtha shall distil over in all and in the proportions named at the several temperatures mentioned.

Analyzation of Naphtha.

11. It shall be competent for the commission, from time to time, and as often as may appear to them to be needful, to take the naphtha from any of the apparatus, and have the same tested by their medical officer of health, or such other agent as they may appoint for such purpose ; and the report of the analysis of such officer or agent shall be accepted by the contractor as correct, and he shall abide by the decision of such agent in respect of quality.

Samples of the naphtha intended to be used by the contractor shall, before it is put into the carburators, be once monthly forwarded to Dr. Letheby, the medical officer of health, for his analysis ; and it shall not be used unless he certifies the naphtha as of proper quality.

Notice to Contractor, before taking Naphtha for Analysis.

Before taking naphtha from the carburators for the purpose of analysis or experiment, twenty-four hours notice shall be given to the contractor, who shall provide a competent person with a ladder, and other means, and appliances necessary, and, as may be directed, for the purpose of obtaining the naphtha and delivering it to the analyst, and the person shall attend where directed, and shall, in all things, comply with the directions given to him by the officer of the commission, and, should such person not attend as directed, or fail to comply with the directions given to him, the commission shall have full power to obtain the requisite assistance for the same purposes, and the expenses so incurred shall be repaid by the contractor.

Discontinuance of Lighting of any Lamps.

The commission shall be empowered, during the term of the contract, to direct that the use of any of the service-pipes, cocks, burners, and apparatus now set up, laid down, or affixed, for the supply of gas to the public lanterns, within the said City, shall be discontinued, and the contractor shall, thereupon, discontinue the lighting of the same, but shall keep the pipeage in good repair until the expiration of the contract, but no deduction shall be made from his account on account of such discontinuance.

Lighting additional Lamps.

Should any additional lanterns be set up by the commission during the contract, they are to be taken charge of by the contractor, lighted, extinguished and repaired, like the other lanterns, and at a proportionate price.

The contractor shall save harmless, and keep indemnified the commission from all costs, charges, damages, and expenses which they may sustain or incur by reason of any breach, neglect, or default of his in any of the covenants and provisions hereinbefore contained, and from and against all actions, suits, claims, and demands, which may be commenced, prosecuted, or made against the commission in respect of any accident or injury that may arise, by reason of the extinction of any of the lights in the said streets or other places, or from any other cause whatsoever arising out of his neglect in performing the covenants of this specification to their true intent and meaning.

If the said contractor shall, from wilful neglect, or any other cause, fail to comply with the provisions of this contract, it shall be lawful for the commission, upon breach or non-performance by the contractor, to employ or contract with any other company or person for transferring the work ; and the contractor shall reimburse to the commission such sums of money as they shall pay, or be liable to pay, under any contracts that may be entered into by them, in pursuance of this provision ; and shall pay and discharge all fines and penalties to which he shall be subject, as well as all costs, charges, and expenses which the commission may incur or sustain by reason of any such breach or non-performance of their contracts.

If the contractor lighting and maintaining the public lamps within the City shall be guilty of any wilful breach or non-performance of any of the covenants and provisions herein contained, it shall be lawful for the commission, if they shall think proper so to do, to determine and put an end to the contract upon the expiration of fourteen days after notice in writing, under the hand of their clerk for the time being, shall have been given to the said contractor ; and in such case, the contract and all the covenants and agreements therein contained shall henceforth cease and be absolutely null and void to all intents and purposes whatsoever.

All the fines and penalties specified and described which may be imposed from time to time upon the contractor shall be considered as liquidated damages ; and the same, together with all other sums of money which may be payable to the commission by virtue and under the clauses of this specification, shall be paid by the contractor to the clerk for the time being of the commission, at the office of the commission in the Guildhall of the City of London ; and, in case of non-payment of any such fines, penalties, and sums of money, it shall be lawful for the commission to deduct and retain the amount out of the moneys which shall become payable by the commission to the contractor, for lighting the public lamps within any portion of the City ; and, in case the same shall exceed the moneys which shall become payable to the contractor, then such excess may be recovered by the commission as the law directs.

The payments will be made by the commission to the contractor quarterly, and the contractor is to make out the bills for the lamps in such form or manner as the commission may require, and shall not be entitled to such quarterly payments until the said bills have been delivered, and duly examined and certified by the proper officer.

The contractor agreeing to light and take charge of the public lamps, shall not be permitted to assign, or otherwise dispose of or part with the contract to any other person or persons whomsoever, without the consent of the Commissioners of Sewers, signified in writing under the hand of their clerk.

The contractor will have to execute a contract including the provisions of this specification, and find two sureties for the due performance of the contract.

Tenders are to be sealed up, and endorsed upon the outside, "*The Commissioners of City Sewers*—Tender for Lighting and Repairing Public Lamps," and to be delivered at the office of the clerk of the commissioners on or before twelve P.M., on Tuesday, the 16th of December, 1862.

The commission does not bind itself to accept the lowest or any tender.

Schedule of Penalties.

In the event of its being satisfactorily proved to the commission that, in any of the particulars hereinbefore mentioned and described, the contract has not been complied with, the contractor is to forfeit and pay to the commission the following sums of money :—

	£	s.	d.
For allowing burners to be fixed or remain, which, under the given restrictions, do not allow, upon the average of one night, the prescribed number of cubic feet of gas per hour to pass—for every offence	0	2	6
For every time that a lantern-glass, service-pipe, or a stop-cock shall not be repaired within twenty-four hours after it has been damaged, or broken, or stand in need of repair	0	2	6
For not duly cleaning the lanterns or burners—for each lantern or burner, per night	0	1	0
For not maintaining the lamps properly lighted for the full time specified between sunset and sunrise—for each offence	0	10	0
For lighting lamps more than twenty minutes before sunset, or allowing them to remain lighted more than twenty minutes after sunrise—for each offence	0	2	6
For not painting the lantern-frames within the time and in the manner specified—per lantern	0	5	0
For not filling the carburators as presented—per lamp, per night	0	2	6
For filling them too full, so as to prevent the due supply of gas—at per lamp, per night	0	2	6
For using naphtha of insufficient strength—for each offence, for each carburator	0	10	0

Tenders are to be made for lighting the public lights, under and to the full intent and meaning of the conditions hereinbefore specified, at per lamp per annum.

FORM OF TENDER.

To the Honourable the Commissioners of Sewers of the City of London.

Gentlemen,—I, , the undersigned, do hereby undertake to light and extinguish the public lamps; clean, paint, and repair the lanterns; repair and keep clear and clean the pipeage and fittings, from the ground-line to the burner; and provide and fill the carburators with naphtha—the whole to be done to your entire satisfaction, at per lamp per annum.—I remain, your obedient servant,

Signed.....
Address.....
Date.....
Name of Surety.....
Address.....
Name of Surety.....
Address.....

TUESDAY, DEC. 9.

Deputy LOTT introduced a deputation from the inhabitants of Bow Lane, Well Court, and George Yard, in the ward of Cordwainer, who presented a memorial, in which they stated that, ever since the introduction of the carburetting process, the streets had been very nearly in total darkness, to the great inconvenience and danger of the public. They, therefore, prayed the commission to revert to the old method of lighting the street-lamps. In moving that the memorial be referred to the General Purposes Committee, to examine into the allegations and to report, the worthy deputy stated that, in his opinion, the carburetting process was a dead failure. The lamps were furnished with an ugly tin canister, from the top of which a few sparkles of light were visible; while, all around and beneath the lamps, was darkness and obscurity. In these times, when street outrages were rife, it was very undesirable that there should be such a deterioration in the public lights; and, with all due deference to the opinions of Dr. Letheby and Dr. Abraham, he thought the present system was the most complete failure he had ever witnessed. He earnestly hoped the process would be altogether banished from the City, and that the commission would return to their former method of lighting. It was evident to him that there was a total disagreement between the contents of the tin cans and the hydrogen gas, which sometimes manifested itself by an explosion, and then the streets were left in utter darkness. It was quite time that an end was put to these experiments.

Mr. C. YOUNG seconded the motion, and hoped the committee would report against the system. It was all very well to talk about the application of science, but, when science left them in darkness, the sooner they had done with it the better.

Alderman ALLEN asked the engineer whether his attention had been called to a new mode of dealing with the public lamps at the West End?

Mr. HAYWOOD said, he had not heard of it.

Alderman ALLEN recommended that he should look into it. It had been adopted in Sackville Street, Piccadilly, and other places. The light was exactly the same, but, on each side of the flame, an ordinary bull's-eye was fixed, which greatly increased its illuminating power. It was a cheap and most effective process, and the effect was to throw the light to a distance of 100 yards, so that each lamp was doing equal duty to two ordinary lamps.

Alderman BESLEY supported the reference of the memorial to the committee.

Deputy HARRISON said, the reference was rather late, seeing that the court had already resolved to continue the carburetting process. But, he thought an inquiry should be made into another matter to which his attention had been directed, and that was, the recent application of some saucer-like apparatus to the public lamps in the neighbourhood of the Royal Exchange, and which he certainly considered was by no means creditable to the commission, as far as the effect produced was concerned. The object of the apparatus was, probably, to regulate the quantity of gas supplied but the effect was to reduce the amount of light in the most extraordinary manner. The flame, instead of being 4½ inches across, was not more than 3 inches, and, altogether, the light was of the most wretched description. He had called the attention of the inspector to it, and he hoped some steps would be taken in the matter.

Mr. H. L. TAYLOR said it was a mistake to suppose that, by referring the memorial to the committee, the whole question of the public lighting of the City would be gone into and reported upon. He thought the matter ought to be debated in the commission, and a full inquiry obtained. The carburetting process had not been adopted without reason, and they ought to know where the blame of its failure rested. In his opinion, it was not a failure in the principle of the thing itself, but in the mode in which the gas had been supplied since its adoption. He supposed that it did not suit the gas company to supply the smaller quantity at the less price, and, therefore, instead of facilitating the system, they had retarded it in every way. He regretted that Dr. Abraham, who had taken so active a part in the discussions of this subject, was not in his place on that occasion; and he did not like to have this fact ignored on account of his absence. The subject ought to be fully discussed, for he could corroborate all that had been said by his worthy colleague, Deputy Lott, as to the present wretched state of the public lighting. However desirous they might be to economize the money of the ratepayers, they had no right to leave the public without proper light.

Mr. SAUNDERS had no objection to the reference to the committee, that the particular circumstances alluded to in the memorial might be considered; but they could hardly expect that the whole subject of the carburetting system would be again discussed, seeing that the commission had just completed arrangements for continuing it in operation for another year. The history of the past showed that the carburetting system in the City was a good thing badly managed, and they ought to know who was to blame for its failure. With regard to the application of regulators, he might inform the worthy deputy that in Birdcage Walk, where they were adopted, the lights were most brilliant and effective; but in the City, what with dirty lanterns, a bad supply of gas, and no one doing his duty, it was not surprising that the same results were not obtained. All the fault was laid to the carburetting process, and the failure of the application of a scientific principle was dwelt upon, but he would ask honourable members, before they condemned the process, to look well into the facts which had hindered its success.

Deputy LOTT said he did not believe that the gas company were to blame in the matter, nor that they had thrown any impediments in the way. On the contrary, he considered the thing had had a fair trial, and was a dead failure, because there was not sufficient evaporation of the naphtha in the close tin canisters to allow of any good effect being produced upon the gas. It was an injustice to the Great Central Company to hamper them with the adoption of the process, and now that, as the result of experience, it was found not to succeed, it ought to be abandoned.

The CHAIRMAN, in putting the resolution, reminded the commission that they had already resolved to continue the system of carburetting for another year, and were about to enter into contracts for the purpose of carrying out their resolution; all, therefore, that the committee could do was to report upon the facts contained in the memorial—viz., the want of proper light in this particular locality.

The motion was then put and carried.

The commission then proceeded to receive tenders for the supply of meters, to be affixed to the public lamps, in that district of the City at present lighted by the Great Central Gas Company, according to the provisions of the following specification, prepared by Mr. Haywood, their engineer:—

SPECIFICATION *for Dry Gas-Meters to be affixed to Public Lamps within the City of London.*

The Commissioners of Sewers of the City of London will receive tenders for providing and fixing 529 dry gas-meters to lamp-columns, and 1243 dry gas-meters to bracket-lamps, each capable of registering 6 cubic feet of gas per hour.

Each party tendering is to send in a meter in a glass case or frame, showing the detail or construction. The meter of the contractor whose tender is accepted is to become the property of the commission, and will be retained by them; he is also to submit an exact model of the mode of fixing proposed by him.

Each meter must be stamped at the City gas-meter inspector's office, Lower Whitecross Street. They must be examined as often as may be required by the commission or the gas companies; and all examinations which may be required during the term the contractor may be bound to keep the meters in repair are to be performed at his expense, if the meter is found not to register correctly, but at the expense of the party requiring the examination if the meter is found to register correctly.

Each meter is to be made of the best charcoal plate, not less than X X, double free from stars and blisters.

The leather is to be of goat-skin, and be well saturated with the best almond oil.

The index of each meter is to show a registration of 10,000 cubic feet, with index-dials 0 to 1 foot, 0 to 100 feet, 0 to 1000 feet, 0 to 10,000 feet, and to be placed in the usual situation.

All valves, slides, and gearing used in the construction of the meters are to be of the best metals; and the meters, in every particular, are to be of the best materials, and be finished in the best possible manner that will render them correct in registration and durable when in use.

The commission, by its agents, shall have full power of inspection of the meters whilst they are in the course of manufacture.

It is desirable that the meters shall be as small as may be compatible with uniformity and correctness of registration, and durability; but in no case can they be allowed to exceed $10\frac{1}{4} \times 7 \times 5\frac{1}{2}$ inches external dimensions, nor $7\frac{1}{4}$ in diameter if round.

The meters to the lamps upon columns are to be fixed to the ladder-irons, as close to the columns as practicable. The meters to the bracket-lamps are to be fixed upon the brackets, or against the wall, as may hereafter be decided upon; but, when fixed against the wall, they will, in all cases, be suspended from the bracket-irons, although the lengths of the suspending-irons may vary.

In all cases where the meters are fixed under the ladder-irons, the inlet and outlet-pipes are to be on the back corners of the meter; when they are suspended from the bracket-irons or against the walls of houses, the inlet and outlet-pipes are to be fixed about one inch from the back of the meter. The inlets to the meters are to reduced to an $\frac{1}{8}$-in. opening by a loose diaphragm, or ring, or washer, which is to be capable of being removed, if required, without injuring the meter. In all cases, the meters are to be fixed to the existing pipeage of the public lamps.

The contractor will be required to fix all the meters in the best possible manner, and in the situations that may be pointed out to him.

The contractor must include all labour and materials necessary for the fixing and properly connecting with the service-pipe.

Should the commission, during the term which may be agreed upon with the contractor, desire to shift the situation of any of the meters, they are to have full power to do so, at their expense.

The contractor will be bound to keep the meters in repair and neatly painted during the whole term contracted for, and leave them in good repair at the expiration of his contract.

The contractor is to give twenty-four hours notice in writing to the gas company when he is about to begin fixing any meters, specifying from day to day the situation where the meters are to be fixed during the ensuing day, and pay for all loss of gas that may take place in the fixing; he is also to give similar notice to the engineer to the commission.

A plan, showing the district in which the meters are to be fixed, may be seen at the engineer's office.

The whole must be made and fixed complete, and be in good working order, to the satisfaction of the engineer to the Commission of City Sewers, by the 31st of January, 1863, and be left in good condition at the expiration of the contract.

The contractor is to forfeit a sum of one shilling per day for every day for each meter that is not fixed on or before the 31st of January, 1863, and to reimburse the commission all the expenses it may incur by reason of such delay; and the commission is to have full power, should the contractor fail to comply with the terms of the specification, to finish the work by other agents or contractors, and recover such expenses from the contractor of these works.

The commission does not bind itself to accept the lowest or any tender.

The contractor shall be bound to supply any additional meters, not exceeding fifty in number, at the same rate and upon the same conditions as may be agreed upon, within four weeks from receiving notice from the engineer to the commission to do so. Should any contractor be unable to supply the whole quantity of meters, he is at liberty to name in his tender the quantity he will be able to affix within the time specified.

The contractor will have to execute a contract including the provisions of this specification, and find two sureties for the due performance of the contract.

The tenders are to include all the costs of providing the meters and materials, and labour of every description for fixing the meters complete, and keeping them in repair, to the satisfaction of the engineer to the commission; and no payment will be made without a certificate of the work being done to his satisfaction.

The tenders are to be sealed up, and endorsed upon the outside, "The Commissioners of City Sewers—Tender for Gas-Meters," and be delivered at the office of the clerk of the commissioners on or before twelve o'clock p.m. on Tuesday, the 9th of December, 1862.

Subject to the foregoing specification, separate amounts are required to be tendered at per meter, upon the subjoined conditions:—

Schedule of Forms of Tenders required.

1. For providing and fixing meters complete, and keeping the same in repair for a period of three years from the 31st day of January, 1863, the payment to be made upon the following terms—six shillings to be paid within three months after the 31st of January, 1863, upon the certificate of the engineer that the work has been done to his satisfaction; the remainder of the cost to be spread in equal proportions over a period of three years, and be payable at the expiration of each year upon the certificate of the engineer—the meters to be the property of the commission—
   For meters if fixed under the ladder-irons . . . At per meter.
2. Upon the same conditions, but for meters if fixed upon brackets . . . . . At per meter.
3. For providing and fixing meters complete, and keeping the same in repair for the period of seven years from the 31st day of January, 1863, the payment to be made upon the following terms—six shillings to be paid within three months after the 31st of January, 1863, upon the certificate of the engineer that the work has been done to his satisfaction: the remainder of the cost to be spread in equal proportions over a period of seven years, and be payable at the expiration of each year upon the certificate of the

engineer—the meters to be the property of the commission—
For meters if fixed under the ladder-irons . . . At per meter.
4. Upon the same conditions, but for meters to be fixed upon brackets . . . . . At per meter.
5. For providing and fixing meters complete, and keeping the same in repair for a term of three years from the 31st day of January, 1863, payment to be made within three months after they have been certified as fixed complete to the satisfaction of the engineer of the commission, excepting a sum of 3s. per meter, which will be retained until the expiration of the term of three years—the meters to be the property of the commission—
If for meters fixed under the ladder-irons . . . At per meter.
6. Upon the same conditions, but for meters to be fixed upon brackets . . . . . At per meter.
7. For providing and fixing meters complete by the 31st of January, 1863, and keeping them in repair, the commission guaranteeing a usage of seven years from that date, and paying a rental for the same—the meters to remain the property of the contractor—
For meters if fixed under the ladder-irons . . . At per meter per annum.
8. Upon the same conditions, but for meters to be fixed upon brackets . . . . . At per meter per annum.

FORM OF TENDER.

To the Honourable the Commissioners of Sewers of the City of London.

Gentlemen,—I, the undersigned, do hereby undertake to supply, fix, and keep in repair, according to the conditions contained in the specification, the number of meters therein stated, or any greater or less number that may be required within the prescribed number, the whole to be done to the entire satisfaction of the Honourable Commissioners of Sewers of the City of London, and at the undermentioned prices:—

According to No. 1 schedule of tenders, at per meter.
" 2 " "
" 3 " "
" 4 " "
" 5 " "
" 6 " "
" 7 " " per annum.
" 8 " " "

Signed.....
Address.....
Date.....
Name of Surety.....
Address.....
Name of Surety.....
Address.....

Mr. DAW having read the advertisement inviting tenders,

The CHAIRMAN said a letter had been received from the Carburating Company, which they wished to have read before the tenders were opened.

The letter was accordingly read. It stated that the company having been informed that it was the intention of the commission to affix meters to the public lamps, were desirous to call attention to a meter recently patented by them, which was specially adapted to the purpose. In addition to the advantage of its being smaller than any meter hitherto in use, it contained within itself a regulator by means of which a considerable saving of gas could be effected, and the supply rendered equable at all times. The meter had been so recently patented* that the company were not in a position to tender for the quantity required by the 1st of February next, but hereafter they would be prepared to furnish them at 12s. 6d. each, with a small additional charge for fixing.

The opening of the tenders, and their consideration, were taken with closed doors, according to the custom of the commission, so that we are not in a position to report the proceedings. We have been since informed that only two tenders were delivered, one of which only contained an offer for the supply of the whole number of meters required. After a lengthened deliberation, the parties were called into court and informed that the commissioners had not been able to come to any determination on the subject; that the further consideration of it had been postponed, and due notice would be given when it was necessary they should attend again.

WANDSWORTH DISTRICT BOARD, WEDNESDAY, DEC. 3.

A report was presented from the gas examiner, stating that the gas of the Phœnix Company had been more free from ammonia during the last three weeks than it had been for some time previously. The illuminating power was at the testing-house, Kennington-lane, on the 26th ult., as high as 18¼ candles. He promised at the next meeting to report the results of his experiments as to the quantity of gas consumed by the public lamps.

ROTHERHITHE VESTRY, TUESDAY, DEC. 2.

Mr. ARNOLD, pursuant to notice, moved the revocation of the resolution of the 3rd of June last, whereby it was resolved to discontinue the office of gas-testing officer. Mr. Arnold said that he did so because he felt that Dr. Vinen had not been properly treated.

Mr. FORD seconded.

Mr. BLAKE did not see the use of appointing such an officer. If they wished to have the gas tested, their medical officer could do so at the place appointed by the company. Independent of which, there was nothing now to complain of; and the gas company was most anxious to properly supply the public.

The CHAIRMAN thought it should be understood that their medical officer, as such, was not qualified to test the gas.

Mr. TILLEY did not put such faith in the gas company, more especially since within the present month they had taken his register-ticket away, telling him he must trust to his memorandums for the future.

Upon a division, Messrs. Jenkins, Holman, Tilley, R. Talbot, Matthews, Erwin, Sanderson, Cox, Ford, Arnold (total 10) voted for it, and Messrs. Goodhew, Hollis, Brakenberry, E. Talbot, Burcham, Blake, and Barrett (total 7), against. There not being a majority of two-thirds, it was declared lost.

WESTMINSTER DISTRICT BOARD, FRIDAY, DEC. 12.

At the Ordinary Monthly Meeting of the Board, held this day—Mr. GODSON in the chair,

Mr. JEBB (the clerk) read a report from the Committee of Works, respecting the supply of gas to the public lamps of the district during the ensuing year. The committee had been in correspondence with the Chartered and Western Gas Companies, who were willing to enter into fresh contracts upon the same terms as at present, viz., the Chartered, at £4. 1s. per lamp per annum, including lighting, extinguishing, cleaning, and repairing; and the Western at £4. The committee recommended the board to adopt these terms. The contract for the few lamps supplied by the Equitable would continue, subject to three months notice on either side, at £4. 2s. 6d. per lamp.

The report was adopted, and the contracts were ordered to be prepared.

A memorial, signed by about fifty gas consumers of the district, was presented, requesting the board to erect a self-registering pressure-gauge to be under the control of a properly qualified person, and examined regularly by him, "in conformity with the Metropolis Gas Act, 1860." The memorialists, in support of their request, said "we feel assured we have but to call your attention to the following facts to ensure your instant acquiescence in our suggestion. Last Saturday offers an example of the generally imperfect supply of gas. There was a gradually diminishing pressure until about 11 o'clock, when it was almost taken off. Numerous instances can be proved of a total absence of light; many of us have none at all. Were this a solitary instance, no notice would be taken of it; but, unfortunately, it is of frequent occurrence. On complaining at the works, an inspector has been sent when, of course, they knew a good pressure is on the main, and he puts his gauge on the meter and ignores our statement altogether, and tells us our fittings are out of order. We need not further attempt to refute this, than by saying that the complaint is general. In conclusion, we most emphatically condemn the system that compels us to be subject to the caprice or inefficiency of the working powers of any single gas company, without some counteracting check."

The consideration of the memorial was adjourned.

COURT OF COMMON COUNCIL, THURSDAY DEC. 12.

At the Meeting of the Court this day—the Right Hon. the LORD MAYOR in the chair,

A motion was brought forward to appoint one or more fit person or persons to examine and audit the accounts of the Great Central Gas Consumers Company to Christmas, 1862, under the provisions of the Act of 14th and 15th Vict., c. 69, and the resolution of the court of the 18th December, 1851.

Mr. C. YOUNG said before the court appointed gentlemen to audit the accounts, he should like to put a question to the officers of the court. It had been stated that the Act under which the auditors were to be appointed had been repealed; and, therefore, he could not see how the appointment could be made.

The COMMON-SERJEANT (Mr. Chambers, Q.C.) said that all the Court of Error did in their recent decision was to say that the Metropolis Gas Act, 1860, was consistent with the company's private Act.

Mr. BUTCHER inquired the names of the gentlemen who were appointed last year as auditors.

The TOWN-CLERK replied, Messrs. Begbie and Chatteris.

Mr. BENGOUGH inquired by whom those gentlemen were paid for their services.

The TOWN-CLERK replied, by the gas company.

The same gentlemen were then re-appointed.

STOREAGE OF PETROLEUM.

COURT OF ALDERMEN OF THE CITY OF LONDON, TUESDAY, DEC. 9.

Alderman FINNIS, as chairman of the General Purposes Committee, presented a report from that body on a subject touching the public safety. On the 29th of September, under the provisions of a recent Act of Parliament, Mr. George Hawkins, of 88, Bishopsgate Street Without, applied to the Court of Aldermen, who are empowered on certain conditions, and within prescribed limits, to grant licences for storing petroleum, for permission to store 200 gallons of that fluid on his premises, at the above address. Subsequently Messrs. Blundell, Spencer, and Co., of 9, Upper Thames Street, made a similar application to the court for a licence to house 400 gallons on their premises there. Both applications were referred for consideration to the General Purposes Committee, and their report was brought up yesterday. With respect to the case of Mr. Hawkins, they stated that they had been furnished with a plan of his premises, on the recommendation adopted by the court on the general subject in October last, and, having duly considered the matter, they were of opinion and recommended that the application should not be granted. They had also carefully considered the application of Messrs. Blundell, Spence, and Co., and could not recommend compliance with it. The report was signed by Aldermen Finnis, Carter, Conder, Sidney, Hale, William Lawrence, Mechi, Humphery, and Phillips. Alderman Finnis said the citizens of London were deeply interested in this very important question, for wherever petroleum was stored it would, as a matter of course, endanger the premises which contained it and also the surrounding property, the owners of which, besides, would suffer great inconvenience by being subject to a higher rate of insurance. Mr. Catty, an officer of the court, had in both cases reported that the premises in question were quite unfit for storing an article of so subtle, inflammable, and dangerous a nature; and he (Alderman Finnis) moved the adoption of the report.

Alderman SIDNEY, M.P., in seconding the motion, said, previous to hearing the subject discussed in committee, he had certainly been in favour of the Act of Parliament of last session, which authorized the Court of Aldermen and certain other public bodies in the metropolis, and in various parts of the kingdom, to license premises for housing petroleum on certain conditions; but he was now convinced that the dangerous character of this article of merchandise was extremely great, and he conceived that the court, in allowing the Act to remain in abeyance, were consulting and promoting the public safety in an especial manner. He believed it was a fact that wherever petroleum was stored the insurance-offices exacted a higher rate of insurance from the neighbourhood. He should be glad to see the report of the committee made public. At the same time, if the parties in question felt aggrieved by the refusal of their applicatiops, they had a clear right to appeal to the Court of Queen's Bench to see justice done. The information on which the committee had acted went to show that petroleum could not be stored on their premises without danger and inconvenience; and, the applications having been refused in their cases, he apprehended that all others in the City of London would be similarly treated, for he could scarcely imagine any part of it in which so dangerous an article could be stored with anything like safety.

Alderman WILLIAM LAWRENCE objected to its being assumed that, because the applications of the parties before the court had been declined, all others would be refused. All that the committee had said, in effect, was that in the exercise of their judgment the premises of the present applicants were not at present suitable for storing petroleum in the quantities which they had indicated; but the committee, and still less the court, had laid down no general and inflexible rule on the subject, and each case must stand or fall on its merits. Great responsibility would certainly always at-

* The patent referred to is one granted on July 7, 1862, to Joshua Kidd, of Cannon Row, Westminster, for "*Improvements in gas-meters;*" the specification of which will not be enrolled till the 7th of next month.

tach to the magistrates of the City of London in licensing premises for the storeage of so inflammable a material as petroleum was known to be. He thought 40 gallons of so dangerous a fluid much too large a quantity to be kept in any one place; and he was sure the Court of Aldermen would do all they could to protect the public against accidents from it.

The motion for adopting the report was then put and confirmed.

ST. SAVIOUR'S DISTRICT BOARD, WEDNESDAY, DEC. 3.

The MEDICAL OFFICER presented the following report:—

Mr. Chairman and Gentlemen,—At each meeting of your board for a considerable period, I have directed your attention to a manufactory in Suffolk Grove, where the distillation of petroleum was carried on to a great extent, and where a large quantity of that so-called oil was stored. You are aware that deputations of the inhabitants of that portion of your district have attended here several times to complain of the very serious effect produced, both upon their health and prosperity, by the gases given off into the surrounding atmosphere during the operations at this manufactory, and, further, we had medical testimony of cases of serious illness undeniably attributable to these causes.

I am induced to make a more special report to you this evening on this matter, because I have been informed that other premises in the Grove have been made ready for manufacturing and storing petroleum. You are aware that petroleum is brought to this country from certain parts of the United States and Canada, where it rises spontaneously in the earth, and is distilled for the purpose of obtaining paraffin candles, paraffin oil, and other products of less value. You know, also, that it has only recently been imported here as an article of commerce, and that the Metropolitan Board of Works, having been acquainted with its noxious and dangerous properties, have wisely made it incumbent upon any person wishing to store more than forty gallons of petroleum within fifty yards of a dwelling-house, or of a building in which goods are placed, to apply to that board for a licence to do so.

Now, in a thickly-populated district like ours, it is of vital importance to the health of the inhabitants that no licence should be granted for storing petroleum at all. The hydrocarbons of which it is composed are so volatile that they penetrate into the innermost recesses of every adjacent building, and the food of the occupiers is frequently tainted thereby. The effects which are produced upon persons resident in the immediate vicinity are uniform in character; they are irritation of the throat, nausea, and voilent retching, cough, and a peculiar prostration of strength. These were the symptoms complained of by almost all those whom I have considered it my duty to make inquiry of, and they number more than 300 persons, whose names are in your possession. In the case of the manufactory alluded to in this report, the Metropolitan Board have refused two separate applications made to them for licences to store, and I trust they will persist in that course in reference to any further application.

Should a nuisance be caused in this district by the distillation of any kind of petroleum, immediate measures will be taken, under the authority of this board, for its suppression, and I hope that any persons who have contemplated either storing or manufacturing from these oils will pause before incurring any expense in fitting up or erecting premises for that purpose, as they may rest assured any such proceeding will continue to be opposed.

I remain, gentlemen, your faithful servant,

Dec. 3, 1861. ROBERT BIANCHI.

A deputation of two gentlemen attended the board to complain of the petroleum nuisance.

Mr. WELLER stated that the smell was as bad as ever. Every morning, after there had been the smell at night, he saw something like tar in the gutters round the premises of Messrs. Humphreys and Yool. The smells produced a suffocating effect on himself and family. Dr. Rendle had traced the nuisance home to the factory.

Mr. LAWES spoke of the numerous complaints made to him. The walls of the premises were saturated with something that was extremely offensive. Some proceedings ought to be taken to protect the poor people living in the immediate locality. The people complained of the smell affecting their throats very severely.

Messrs. Humphreys, Yool, M'Queen, and Swann also waited upon the board in reference to the same subject.

Mr. YOOL spoke of a waggon-load of material which it had been alleged belonged to him, and he now denied that the waggon or material belonged to him.

Mr. M'QUEEN stated that no licence was required for storing Canadian oil. He sold it, and how it came to be in the street was because the buyer refused to receive it, and so they returned it.

Mr. HUMPHREYS thought they ought not to be blamed in this matter, as they had nothing to do with it.

Mr. FIELD suggested that on another occasion such material should be taken to the greenyard.

Mr. HUMPHREYS replied they would not take it in.

Mr. FIELD thought, if no one would have this oil on their premises, this was a good reason why it should not be stored in their neighbourhood.

Mr. HUMPHREYS observed that the smell was so offensive that it ought not to be stored any where near dwelling-houses. A complaint had been lodged that petroleum was stored on the premises of Messrs. Humphreys and Yool, and Mr. Superintendent Branford, by Sir Richard Mayne's instructions, had twice visited the works, and he would refer the board to him to ascertain whether there was a nuisance. There was no smell emanating from their works. There was another place from which the smell came, but it was not for him to give information about it.

A bottle was produced of material manufactured at the premises of Messrs. Humphreys and Yool, the effluvia from which was most offensive, and Mr. HUMPHREYS said that this was a product from coal, and not from petroleum, Canadian, Pennsylvanian, or Rangoon earth-oil. A licence was not required for their present manufacture, which had been carried on for five years.

Mr. YOOL stated that nothing went into the drains from their premises but clear water used in cooling the worms of the still.

A letter from the Metropolitan Board asked the opinion of the board as to whether they should grant the application of Messrs. Humphrey, Yool, and Co., for a licence to store oil on their premises in Suffolk Grove?

Mr. THORN moved—"That the board send a reply requesting that the application should not be granted; that a copy of the medical officer's report be also forwarded, and that the central board be informed that there were dwelling-houses within a few feet of the premises."

Mr. ISAACS seconded the motion, which was carried.

Mr. MONNERY again spoke of the strong smell of paraffin or petroleum in the neighbourhood of London Bridge, and expressed his opinion that there was some storeage of one or the other of these oils in that locality.

The attention of the officers was drawn to the subject.

VESTRY OF ST. GEORGE THE MARTYR, SOUTHWARK,

MONDAY, DEC. 1.

A deputation attended the vestry, to complain of the continual existence of the petroleum nuisance in Suffolk Grove, and to request the assistance of the vestry in the matter.

Mr. WELLER addressed the vestry on the subject. He affirmed that he and Mr. Rendle had ascertained the place where the nuisance was created. He detailed facts, showing that the inspector of St. Saviour's board had said he had seen enough to enable an action to be brought, but nothing had been done.

Mr. RENDLE said, he accompanied the last speaker on one occasion, and they went down Prince's Place, at the rear of the suspected premises. He put his finger into a hole in the wall, and there was the same smell as that complained of. In Thomas's Court, the smell was so bad, that he would not, under any circumstances, live there. On going into Suffolk Grove, just beyond the gate of the factory, he perceived the smell coming from the premises. He thought there was a leakage or pipe by which the offensive matter passed down into the sewers. He strongly denounced, on medical grounds, this manufacture being allowed to be carried on. He moved—"That the serious attention of the parish in which this nuisance exists be drawn to it."

Mr. JAMES seconded the motion, which was carried.

ON THE DIFFERENT VARIETIES OF BURNERS USED FOR GAS LIGHTING; AND RESEARCHES ON THE BEST CONDITIONS FOR THE COMBUSTION OF GAS.

By M.M. PAUL AUDOUIN and PAUL BÉRARD.

(*Continued from page* 736.)

Researches on Flames and Burners.

It was interesting to inquire if the before-mentioned law was verified by one of the same burners in which the consumption was made to vary, and if, in diminishing the speed of the gas that it consumed, an increase was observed in the intensity of the light produced. In order to make this experiment, we used a burner of the series No. 5, with a narrow slit (1/89th of an inch) formerly employed in the street-lamps, in which the gas was consumed under considerable pressure. The intensity of this burner was made to vary tenth by tenth in comparison, the Bengel burner taken as a standard. The following were the results obtained:—

Experiments with a Burner of the Fifth Series; Slit, 1/89th of an inch wide (old pattern), at different Consumptions.

Consumpt of the Burner under Trial.	Consumpt of the Bengel Argand Standard Burner without Cone; 8-inch Chimney.	Comparative Intensities. The Bengel Burner = 100.	Pressures.	Calculated Consumpts for an Uniform Intensity = 100, and for 100 Litres by the Standard Burner.	
Cub. Ft.	Cubic Feet.		Inches.		
7·4520	3·5318	120	·82677	175	
6·6750	3·3905	110	·74803	178	
6·3572	3·6377	100	·70866	174	
5·5096	3·6730	90	·51181	166	Maximum.
5·0151	3·6730	80	·43307	170	Maximum.
4·3793	3·5671	70	·39370	171	Maximum.
3·6024	3·5671	60	·27559	166	Maximum.
3·1079	3·6024	50	·23622	172	
2·4015	3·5318	40	·19685	170	
2·0131	3·6024	30	·11811	183	

It will be seen from this table, that in reducing the consumption of the burner under trial to a uniform intensity, a maximum is found which corresponds to the consumptions ranging between 3½ and 5¼ cubic feet of gas per hour. The pressure goes on diminishing in proportion as this maximum is approached; but, for small consumptions, although the pressure continues to diminish, the burner becomes disadvantageous, and its illuminating power decreases more and more. Here is an evident contradiction to the law that we have laid down; but, the following facts demonstrate that this contradiction is only apparent, and depends on a new fact which we have thrown light upon.

We had already observed in our numerous experiments that, contrary to the generally received opinion, small consumptions were disadvantageous in respect of the illuminating power. If that was true, burners with large slits, in which the gas was consumed under a feeble pressure, ought to present, for small consumptions, a diminution in the intensity of the light produced. The following table proves the truth of this proposition:—

Experiments with a Burner of the Fifth Series; Slit, 1/63rd of an inch wide, at different Consumptions.

Consumpt of the Burner under Trial.	Consumpt of the Bengel Argand Standard Burner without Cone; 8-inch Chimney.	Comparative Intensities. The Bengel Burner = 100.	Pressures.	Calculated Consumpts for an Uniform Intensity = 100, and for 100 Litres by the Standard Burner.
Cub. Ft.	Cubic Feet.		Inches.	
9·3238	3·7437	200	·23622	124
8·3350	3·7083	180	·19685	124
7·3461	3·7083	160	·15748	123
6·4278	3·7083	140	·13779	123
5·3683	3·6730	120	·11811	121
4·5913	3·6730	100	·09842	125
3·9555	3·6730	80	·07874	133
3·1786	3·6730	60	·07480	144
2·6487	3·6730	50	·07480	145
2·3309	3·6730	40	·03937	150
1·5186	3·6730	20	·01968	207
·9888	3·6730	10	..	269

These experiments, which have been made in the same manner as the preceding ones, demonstrate—

1. That *when the consumption of a burner is small, this burner loses much of its illuminating power, although the pressure under which it burns diminishes*, and that this loss may be equal to one half;

2. That for each burner there is a consumption which gives the greatest quantity of light that this burner can produce, and that this maximum is obtained in burners with a large slit under a pressure of ·11811 of an inch.

In comparing this table with the preceding one, it is also seen that the same effect is to be found with regard to burners with narrow slits; but, that with them the maximum light produced corresponds to a speed of flow greater than in the burners with wide slits. A maximum, also, is found which corresponds to a diminution in the pressure; but, in small consumptions, a new cause for the loss of light arises—the illuminating power diminishes although the pressure equally diminishes.*

Flames.—It remained now to determine what relation existed between the illuminating power of the gas and the dimension of the flames in the three series of burners, adjusted to their normal consumptions. The old contract gives the following numbers as the dimensions of the flames for a stipulated intensity of each burner:—

Series.	Dimensions.		Intensities.	Consumpts.
	Height.	Width.		
	Inches.	Inches.		Cub. Ft.
1	1·14	2·25	0·77	3·5316
2	1·27	2·63	1·10	4·9442
3	1·77	3·70	1·72	7·6032

We were desirous of assuring ourselves whether the conditions as to dimensions and intensities imposed by the contract were compatible with each other; and, in a more general manner, what was the relation between the intensity and the dimensions of the flame in a bat's-wing burner. For this purpose, we operated with a burner of the No. 2 series, adjusted to the normal consumption of 4·9442 cubic feet per hour; and, to obtain in a more certain manner the relation sought for, gas of a very varying illuminating power was used, such as that which is produced by a retort at different periods of the distillation. The gas employed was produced directly from a retort charged at 10 h. 45 m., and discharged at 3 h. 30 m. The observations were made in this interval every quarter of an hour. The following is a table of the results:—

Burner of the Second Series; Slit, 1/89th of an inch wide;
Consumpt, 4·9422 cubic feet per hour.

Illuminating Power, compared with a Carcel Lamp burning 648 Grains.	Dimensions.	
	Height.	Width.
	Inches.	Inches.
0·06	1·57480	2·55905
0·06	1·57480	2·63779
0·08	1·57480	2·67716
0·09	1·57480	2·75590
0·10	1·57480	2·87401
0·12	1·57480	2·91338
0·24	1·61417	2·91338
0·31	1·69291	2·95275
0·46	1·85039	3·07086
0·56	1·92913	3·14960
0·67	2·12598	3·42519
0·80	2·12598	3·42519
0·82	2·12598	3·54330
0·94	2·12598	3·74015
1·15	2·12598	3·81889
1·47	2·16535	3·95668
1·50	2·16535	4·13385
1·57	2·16535	4·13385
1·76	2·36220	4·52755
1·95	1·81102	4·72440

This table demonstrates—

1. That with burners of the second series the intensity increasing from 1 to 32, the height of the flame increases from 1 to 1·6, and the width from 1 to 1·8—that is to say, that for very different intensities, the dimensions of the flame vary only to a considerably less extent;

2. That the height of the flame sensibly tends to remain uniform, and that its curve presents almost the aspect of a straight line, especially for the medium intensities. (See fig. 7, next col.)

The fact of the uniformity of the height of the flame in bat's-wing burners is general—it is equally true with regard to narrow slits as well as wide slits. As we have just seen, it is possible in a bat's-wing burner with a narrow slit to cause the illuminating power to vary considerably, the consumption remaining constant, without any great change in the height of the flame. It may be also demonstrated that in a bat's-wing burner the consumption may be

* All these experiments were made upon gas of the ordinary quality, obtained from Belgian coal. For richer gases, such as those derived from cannel, Boghead, and similar substances, the conditions of combustion are no longer the same, and narrow slits are more advantageous than larger ones, the gas requiring a larger quantity of air for its combustion.

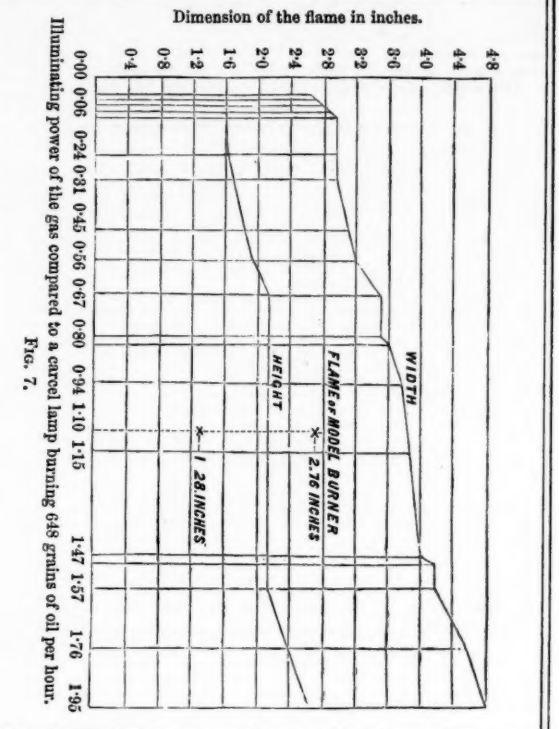

Fig. 7.

doubled, the illuminating power remaining sensibly uniform, without much increasing the height of the flame.

The burners that should be chosen for these experiments are burners with large slits, which are well adapted for excessive consumptions. The burner of the fifth series, with a slit one-thirty-sixth of an inch wide, gives a very fine flame when burning from 10½ to 12½ feet of gas per hour. The burner of the tenth series, with a slit of the same dimensions, gives a magnificent flame, under the following conditions:—

Consumpt of a Burner of the Tenth Series.	Intensity.	Consumpt of the Standard Bengel Argand, with Cone and 10-inch Chimney.	Pressure at the Burner under Trial.	Size of the Flame.	
				Width.	Height.
Cub. Ft.		Cub. Ft.	Inches.	Inches.	Inches.
12·7144	2·35	5·0504	·35433	6·2992	3·5433

Moreover, burners with large slits have, as we have already demonstrated, an almost uniform illuminating power for large consumptions. For the purpose of these experiments, we filled with gas a gasholder of 35·318 cubic feet capacity, which we afterwards placed in communication with the burner under trial, the consumption being ascertained by an intermediate meter. We loaded the gasholder, in order to obtain a strong current of gas, and were by this means able to obtain a consumption up to 17·659 cubic feet per hour, with a burner of the fifth series. In thus increasing the consumption in considerable quantities, it will be seen that the flame increases in width, without sensibly changing its height. When the consumption is very much exaggerated, the flame, instead of remaining half-round, which it was, becomes triangular; and, with about 14 feet, it presents the form of a fan fringed in its upper part, and segmental in its interior. At this moment, the illuminating power diminishes very sensibly.

The following table gives the results we obtained in causing a burner of the 5th series, with a slit 1/36th of an inch wide, to burn under the conditions that we have just described:—

Consumpt of a Burner of the Fifth Series.	Intensities. The Bengel Standard = 100.	Consumpts of the Bengel Standard, with Cone and 10-inch Chimney.	Pressure at the Burner under Trial.	Sizes of the Flame.		Calculated Consumpt for 100 Litres of the Standard, and for an Intensity = 100.
				Height.	Width.	
Cub. Ft.		Cub. Ft.	Inches.	Inches.	Inches.	
17·6590	235	5·0504	·82677	3·9370	10·6299	147
15·3632	225	5·1210	·62992	3·7401	9·4488	134
14·4803	210	5·1917	·55118	3·7401	8·6614	132
13·9505	200	5·0504	·47244	..	..	138
11·4782	190	5·1917	·39370	3·5433	7·0866	132
10·2068	170	5·0151	·31496	3·1496	5·5118	120
9·6064	160	4·9798	·27559	3·1496	5·1181	120
8·4056	140	4·9445	·21653	3·1496	4·7244	121
7·4167	130	4·9445	·15748	3·1496	4·1338	119

It will be seen from this table that in varying the consumption in the proportion of 1 to 1·8—that is to say, almost double—the practical effect produced by the gas was in the proportion of 1 to 1·1—that is to say, almost uniform. The height of the flame varying in the proportion of 1 to 1·1, while its width increased from 1 to 2·2. It will be seen also that the maximum illuminating power was obtained from feeble pressures, as had been already demonstrated for normal consumptions, and that this illuminating power had a tendency to remain constant for consumptions varying from 10½ to 14 feet per hour, beyond which there was considerable loss in the intensity of the light produced, which loss was accompanied by a complete change in the form of the flame.

Experiments with Single Jet Burners.

Jet burners consist of a metallic button pierced by a circular hole. They are used because of their small consumption of gas in places where only a small light is required. Our experiments have been made upon burners, of which the holes varied from 1/50th of an inch to 1/7th of an inch in diameter. Having in view the special subject of these burners, our trials were principally directed to the dimensions of the flame, which was increased by two inches at each trial, until it became smoky. The illuminating power of these burners was compared to that of a carcel lamp, burning 648 grains per hour, and the pressure under which the gas was burned was observed by a water-pressure gauge, fitted to the pillar by which the light was carried. The table of these trials that we give annexed is completed, by calculating by the rule of three the quantity of gas that the burners consumed under the different conditions of the experiments to equal the carcel lamp, and also the quantity they would burn to equal a stearine candle, the lamp being equal to 7 candles. The column of these numbers gives at the same time the measure of the illuminating power, and permits the maximums to be sought for.

Diameter of the Holes.	Height of the Flame.	Consumpt per Hour.	Intensity compared to a Carcel Lamp burning 648 Grains.	Calculated Consumpt to equal		Pressure.	Observations.
				A Carcel Lamp burning 648 Grains.	A Stearine Candle.		
Inches.	Inches.	Cub. Ft.		Cub. Ft.	Cub. Ft.	Inches.	
1/50	2·6377	·8122	0·01	57·9084	8·1231	2·9133	Cock entirely open; flame pale.
1/25	2·6377	·8828	0·06	14·6922	1·9424	·27559	Flame pale.
	3·9370	1·3067	0·14	9·3238	1·3067	·43307	„ regular.
	4·6062	1·8012	0·24	7·4873	1·0595	·86614	„ good.
	7·8740	2·3309	0·38	6·1099	·8475	1·37795	„ „
	9·8425	2·8254	0·51	5·5096	·7769	1·96850	„ „
	11·8110	3·5316	0·65	5·4036	·7769	2·67716	„ „
1/18	2·6377	·8828	0·08	10·3834	1·4480	·15748	Flame good.
	3·9370	1·2714	0·17	7·4520	1·0595	·23622	„ „ and regular.
	4·6062	1·9424	0·31	6·2512	·8828	·35433	„ „ „ „
	7·8740	2·4015	0·43	5·5802	·7769	·51181	„ „ „ „
	9·8425	2·8960	0·57	5·0504	·7063	·74803	„ rather flagging.
	11·8110	3·8849	0·71	5·4389	·7769	1·10236	„ „ „
1/12	2·6377	·9182	0·12	7·6286	1·0555	·05905	Flame rather flagging.
	3·9370	1·2007	0·21	5·6861	·7769	·07874	„ „ „
	4·6062	1·9071	0·33	5·7567	·7769	·11811	„ flagging.
	7·8740	2·3309	0·46	5·0504	·7063	·15478	„ „
	9·8425	3·0373	0·64	4·7325	·6709	·19685	„ irregular.
	11·8110	3·8849	0·89	4·3440	·6003	·35433	„ very irregular.
1/10	2·6377	·7063	0·15	4·6972	·6356	·03937	Flame flagging.
	3·9370	·9888	0·18	5·4742	·7416	·03937	„ of a candle.
	4·6062	1·4127	0·28	5·0151	·7063	·03937	„ very flagging.
	7·8740	2·2602	0·33	6·8163	·7769	·07874	„ too high to be used.
	9·8425	3·1079	0·47	6·6044	·9182	·11811	
	11·8110	4·2381	0·65	5·7920	·9182	·15748	
1/8	2·6377	·7063	0·17	4·1321	·5650	·03937	Flame of a candle.
	3·9370	1·1654	0·20	4·8385	·6709	·03937	„ smoky.
1/7	2·6377	·7769	0·16	4·6266	·6356	·03937	Impracticable.
	3·9370	1·1654	0·22	5·2977	·9888	·03937	

It will be seen from this table, that with single jet burners—

1. The consumption tends to be uniform for the same height of flame, whatever may be the diameter of the hole;

2. That like burners with slits, the illuminating power increases with the diameter of the holes; but, this increase is less rapid in jet burners;

3. That in burners with slits large consumptions are more advantageous than small ones; but no point is found with jet burners from which large consumptions become disadvantageous. The increase of illuminating power with consumption is as it were indefinite, although this in its application must not be considered as true, as there is a moment when the burner smokes, or when the flames attain such a height that they cannot be employed;

4. That jet burners are generally disadvantageous because, under the best circumstances, they do not give an intensity equal to a carcel lamp, unless about 5¼ feet of gas per hour are consumed;

5. There is with these burners an experimental maximum and a practical maximum, with regard to their illuminating power. The first corresponds to a diameter of hole of 1/12th of an inch, and a height of flame of 12 inches, with a consumption of 4·344 cubic feet per hour; but, in this case, the flame is too long, and is smoky, and is altogether one which cannot be practically used. The second maximum may be considered under two particular points of view. If it is desired to vary the consumption of the burner, in order to have variable quantities of light, a burner should be employed with a jet 1/17th of an inch in diameter, which adapts itself to very different conditions, and gives a good flame of from 2½ to 10 inches high for moderate consumptions. But as the jet burner is only used for flames of small height, more or less similar to those of candles, a hole, of 1/12th of an inch diameter, is most advantageous. With such a burner, the maximum light is given for a consumption of 1·2 cubic foot per hour, with a flame 4 inches high. Beyond these dimensions, the flame becomes smoky and unsteady;

6. The law with regard to pressure, which was laid down as applying to bat's-wing burners—*the greatest illuminating power coincides with the lowest pressure*—holds good with regard to jet burners, account being taken of the different conditions in which the current of gas is directed. It may be said, in fact, that in jet burners in proportion as the illuminating power increases, in consequence of the increase in the diameter of the holes, the pressure *for the same height of flame* becomes more and more feeble. Some figures borrowed from the preceding table will suffice to render this fact apparent:—

Flame, 4 in. high.

Diameter of the Holes.	Consumpt to equal a Carcel Lamp burning 648 Grains.	Pressure.
Inches.	Cub. Ft.	Inches.
1/25	9·3238	·43307
1/18	7·4520	·23622
1/12	5·6861	·07874
1/10	5·4742	·03937

It will be seen, therefore, that the law which has been laid down in a

general manner with regard to bat's-wing burners should undergo the following modification with regard to jet burners—*for the same height of flame the greatest illuminating power always corresponds with the weakest pressure.* It being demonstrated that account must be taken of the height of the flame, in the observations of this law, the reason why it presents itself in a manner so absolute with regard to bat's-wing burners is easily understood. In fact, their examination has proved to us that the height of the flame tends to remain uniform in the same burner, whatever may be its intensity or its consumption. In the jet burners, on the contrary, the height of the flame increases from 1 to 4·6 when the consumption is increased from 1 to 4.

Union Jet or Fish-Tail (Manchester) Burners.

The union-jet burner is composed of a small, hollow, cast-iron cylinder, terminated by a somewhat thick disc. In this disc two holes are pierced in the same vertical plane, but in an oblique direction, so that the two currents of gas which escape from these holes meet, and expand by flattening themselves one against the other, and thus form a fan-like shaped flame, of which the plan is perpendicular to the holes. It will be seen thence that such burners may be considered as formed by two single jets, the flames of which come in contact at a short distance from the point at which they issue.

In order to study the influence of this contact, and of the flattening which results from it, upon the illuminating power, we caused to be constructed an apparatus composed of two single-jet burners, mounted upon moveable arms, by which they could be approached to each other, inclining them in such a manner as to obtain a flame identical to that of the union jet burner. The

Fig. 8.

trials were first made in burning the two single-jet burners parallel to each other, and observing their illuminating power. They were afterwards brought nearer to each other, and the luminiferous intensity of the union jet produced by the union of the two single jets was determined.

When the consumption of the union jet is carried too far, the flame changes its form, and becomes analogous to that of a single-jet burner burning with a mixture of air, and producing a whistling, which gives notice of this excess of consumption. This is one of the advantages of this class of burners, inasmuch as it permits them to be regulated to a maximum consumption. Thus, in the trials which follow, the greatest consumption has been taken for each hole that it was capable of producing. The following is the table of these experiments:—

Table No. 1.

Dia. of the Holes.	Consumpts. Two Single Jets.	Consumpts. Union Jet, formed by uniting the Two Jets.	Pressure.	Consumpt of the Standard Bengel Argand.	Intensity.	Consumpt per 100 Litres of the Standard, and an Intensity = 100.	Diff.
In.	Cub. Ft.	Cub. Ft.	Inches.	Cub. Ft.			
1/26	2·1190	..	1·1811	2·5428	40	208	1
do.	..	2·2249	1·1811	2·6487	40	209	
1/21	2·3309	..	1·1417	3·0019	40	194	12
do.	..	2·4368	1·1417	3·3551	40	182	
1/19	2·4368	..	1·1023	2·8960	50	168	13
do.	..	2·4722	1·1023	3·1786	50	155	
1/13	6·7104	..	·2362	3·5316	110	172	69
do.	..	6·7104	·2362	3·6024	180	103	
1/12	9·0060	..	·1968	3·5316	126	202	92
do.	..	9·0060	·1968	3·3905	240	110	
1/10	8·3350	..	·1181	3·4964	130	183	84
do.	..	8·3350	·1181	3·4964	240	99	
1/9	7·7699	..	·0393	3·4964	130	Smokes.	
do.	The pressure is too feeble to flatten the flame.						

From this table it will be seen—

1. That two single jets of small diameter give an illuminating power equal to that of the union jet formed by uniting them together;

2. That, in proportion as the diameter of the holes is increased, the superiority of the union jet to the single jet becomes greater;

3. That where the diameter of the holes is very great, the flame of the union jet is no longer regular, and the difference between its illuminating power and that of the burner of two single jets from which it is produced tends to diminish.

The confirmation of the law of pressures which we have already observed is to be found herein, and it will also be seen that the union jet burner should be burned under a pressure of at least ·11811 inches, without which the two jets of gas do not come in contact with each other at a speed sufficiently great to flatten them and render them regular.

The following is another table which may serve to determine the influence of the diameters of the holes of union jet burners upon the illuminating power:—

Table No. 2.

Diam. of the Holes.	Consumpt of the Union Jet.	Intensity.	Consumpt of the Standard Bengel Argand.	Pressure.	Consumpt for 100 Litres of the Standard, and for an Intensity = 100.	Observations.
In.	Cub. Ft.		Cub. Ft.	Inches.		
1/26	2·4722	15	3·8849	·47244	424	Maximum consumpt.
1/22	1·9424	20	3·7790	·15748	255	
	3·3905	40	3·7790	·39370	222	Maximum consumpt.
1/18	3·0019	50	3·9202	·11811	153	
	4·2027	75	3·9202	·23622	142	
	5·8273	100	3·9202	·45307	149	Maximum consumpt.
1/16	2·6841	50	3·7790	·11811	142	
	3·8849	75	3·7437	·19685	137	
	5·1564	100	3·7437	·39370	137	
	7·4167	125	3·7437	·51181	158	Maximum consumpt.

The diameter of the holes which give the maximum illuminating power ranges between 1/15th and 1/12th of an inch; but the use of burners with such holes requires a consumption of about 7 cubic feet an hour. If such large holes were used for small consumptions (the pressure diminishing with the consumption), the flame would not be defined and regular. For consumptions of from 3½ to 5¼ cubic feet per hour, the diameter of the holes ought to be 1/17th of an inch. The fact is proved by the preceding table, that in the union jet burners too great and too small consumptions must be avoided; and that for each burner there is a normal consumption, which must be observed in order to obtain the maximum illuminating power. Where the consumption is small, the pressure is very feeble, and the flame is badly shaped; where the consumption is excessive, the pressure becomes too great, and the rapidity of the flow of gas is the cause of too great a rapidity in its combustion.

These experiments also demonstrate how much a smoky flame, and of inferior illuminating power, gains in intensity when its surface is augmented. A union jet burner may give nearly 50 per cent. more light than two single jets, from the reunion of which it is formed. This increase in the illuminating power is not uniform for the same consumption, as the following table shows, where three pairs of single-jet burners, of different diameters, have been adjusted to a consumption differing but slightly, and coupled afterwards into union jets:—

Diam. of the Holes.	Consumpts. Two Single Jets.	Consumpts. Union Jet, formed by uniting the Two Jets.	Pressure.	Consumpt of the Standard Bengel Argand.	Intensity.	Consumpt for 100 Litres of the Standard, and for an Intensity = 100.	Diff.
In.	Cub. Ft.	Cub. Ft.	Inches.	Cub. Ft.			
1/29	3·6024	..	·51181	3·5316	50	204	−22
do.	..	3·6024	·51181	3·5316	45	206	
1/18	4·0614	..	·07874	3·4258	62	190	+93
do.	..	3·8849	·07874	3·4964	115	97	
1/11	3·4258	..	·03937	3·1786	58	185	+60
do.	..	3·4258	·03937	3·1786	85	125	

But this increase is almost always uniform for the same dimensions of holes, whatever may be the consumption, as will be seen from the following table, where two single-jet burners, of 1/10th of an inch in diameter, have been coupled to form a union jet, the consumption of which has been made to vary from 1·3067 to 7·7699 cubic feet:—

Consumpt of Two Single Jet Burners; Holes, 1/10th of an inch Diameter.	Consumpt of a Union Jet, formed by uniting the Two Jets.	Consumpt of the Standard Bengel Argand.	Intensity.	Height of the Flame.	Consumpt for 100 Litres of the Standard, and for an Intensity = 100.	Diff.
Cub. Ft.	Cub. Ft.	Cub. Ft.		Inches.		
1·3067	..	3·3198	16	1·9685	243	48
do.	1·3067	3·3198	20	..	195	
2·2955	..	3·3905	38	3·9370	176	42
do.	2·2955	3·3198	50	3·9370	134	
3·8849	..	3·3198	62	5·9055	172	48
do.	3·8849	3·3198	86	4·3700	124	
4·9445	..	3·3551	90	7·8740	163	43
do.	4·9445	3·3551	122	4·7244	120	
6·1805	..	3·4611	110	9·8425	161	58
do.	6·1805	3·5318	170	5·1181	103	
7·4167	..	3·8143	110	11·8110	167	63
do.	7·4167	3·9202	190	5·1181	104	

Argands, or Burners with a Double Current of Air.

These burners are constructed on the principle of the carcel lamp, and are composed of a circular ring pierced either with a continuous slit, or with holes of variable numbers. The burner supports a cylindrical glass chimney, by means of a metallic gallery or holder. The air penetrates by the openings in this gallery to the exterior periphery of the flame, and it reaches also the centre of the flame by a circular opening formed in the axis of the burner. The current of air is regulated by means of baskets, either in porcelain or in metal, the object of which is to diminish the access of the air, and, by means of metallic trunks of cones, which direct the current of air towards the base of the flame. The illuminating power of these burners may vary considerably. The following table, which presents an outline of the experiments which we made upon the principal burners of this form used in Paris, shows that burners of almost the same appearance may require double the consumption of gas in order to give the same intensity of light. It will be seen, also, that the most advantageous of these burners is the Bengel burner, which is constructed in porcelain, and pierced with 30 holes of 1/42nd of an inch in diameter :—

Consumpt of the Carcel Lamp.	Description of Burner. (Chimney, 10 inches high.)	Consumpt of each Burner for an Intensity equal to that of the Lamp.
		Cub. Ft.
648 grs.	Bengel 30 hole argand (with cone) . .	4·4500
	Dumas'* half burner, with circular slit .	5·3330
	Dubail's 10-hole argand	5·4742
	„ 16 „	5·6155
	Bengel 20 „	
	„ 40 „	5·6508
	Bourgeois' 20 „	5·7567
	Dumas' argand, with circular slit . . .	5·9333
	Dubail's 20-hole argand	6·0746
	Argand, with circular slit	6·0746
	English 12-hole argand (Lacarrière) . .	6·3572
	Maccaud's 20-hole argand	6·3572
	Lacarrière's 12 „	6·4984
	„ 20 „	6·6750
	English 20 „ (Lacarrière's)	7·0989
	Lacarrière's 6 „	10·3834

* Gas apparatus manufacturer.

It results from the experiments upon these burners that the differences in the illuminating power are principally due—

1. To the diameter of the holes or the width of the slit;
2. To the number of the holes;
3. To the manner in which the air is distributed;
4. To the height of the chimney.

Diameter of the Holes.—The observations already made with regard to the advantage of large slits for bat's-wing burners, and holes of large diameter for single-jet burners, are applicable to argand burners in respect to the influence of the diameter of the holes.

The following experiments were made upon a copper burner of 20 holes, the diameter of which was successively augmented :—

Consumpt of the Lamp.	Dimensions of the Holes.	Consumpt of the Burner under Trial.	Pressure.	Height of the Flame.	Observations.
	Inches.	Cub. Ft.	Inches.	Inches.	
648 grs.	1/42	5·4742	·19685	..	
	1/36	5·0151	·11811	..	
	1/28	4·5913	·03937	2·6771	Good flame.
	1/23	4·7678	·0.	3·5433	

In these experiments, the burner was placed at the same distance as the lamp from the photometer; and, for each dimension of the holes, the illuminating power was rendered equal to that of the carcel lamp.

It will be seen from this table that, for the same intensity of light, the consumption diminishes with the diameter of the holes—that is to say, that the illuminating power augments up to a diameter of 1/28th of an inch. From this point, the burner deteriorates when the holes are enlarged. In this table, also, may be remarked a verification of the law already observed with regard to the pressures—that is, that the illuminating power is the greatest when the pressures are weakest. Where the aperture for the escape of the gas is too large, and the consumption small, the pressure being *nil*, and consequently the flow very feeble, the flame is languid, and has not any defined form; the thickness of the sheet of gas diminishing the contact with the air, and causes the burner to smoke. Being desirous of determining with greater precision the influence of the diameter of the holes upon the illuminating power, we had a copper burner constructed identical with the Bengel burner, and fitted like it. We enlarged these holes from 1/56th of an inch up to 1/18th of an inch. The copper burner and the standard porcelain burner being placed at equal distances from the photometer, their respective intensities were equalized, and the proportion between the consumptions gave the relative values of the burners with regard to their illuminating powers :—

Diameter of the Holes.	Consumpts. Without Cone. Of the Bengel Argand, the Holes of which were varied.	Consumpts. Without Cone. Of the Standard Bengel Argand.	Consumpts. Without Cone. Of the Burner under Trial for each 100 Litres of the Standard.	Consumpts. With Cone. Of the Bengel Argand, the Holes of which were varied.	Consumpts. With Cone. Of the Standard Bengel Argand.	Consumpts. With Cone. Of the Burner under Trial for each 100 Litres of the Standard.	Observations.
In.	Cub. Ft.	Cub. Ft.		Cub. Ft.	Cub. Ft.		
1/35	3·8143	3·7790	110	..	..	..	
do.	..	..	..	5·0857	4·4146	115	
1/41	3·4964	3·4611	101	..	..	..	
do.	..	..	..	4·1321	4·1321	100	
1/38	..	..	..	..	..	..	
do.	..	..	..	3·9908	3·9555	100	
1/30	3·5316	3·4964	101	..	..	..	
do.	..	..	..	3·9908	4·1321	96	Very good flame.
1/26	3·2492	3·2139	101	..	..	..	
do.	..	..	..	3·6730	3·7437	98	Good flame.
1/24	3·5671	3·4258	104	..	..	..	
do.	..	..	..	3·5316	3·6024	98	Good flame.
1/21	3·6377	3·4964	104	..	..	..	
do.	..	..	..	3·9202	3·9908	98	Flame long and flagging.
1/18	..	..	..	..	..	..	
do.	..	..	..	4·1321	4·0614	102	

These experiments prove like the preceding ones—

1. That the maximum illuminating power is obtained from holes of from 1/42nd to 1/31st of an inch in diameter, the requisite conditions of the regularity of the flame being fulfilled by them. With larger diameters the flame becomes smoky;

2. Holes of 1/25th of an inch in diameter may be employed with cones, which increase the combustion and give a fine flame and a good illuminating power; but, in this case, too large consumptions must be avoided as will be seen from the following trial, in which too great a consumption produced a diminution in illuminating power in consequence of the insufficiency of the air.

Diameter of the Holes.	Consumpt of the Bengel With Cone. Copper Burner.	Consumpt of the Bengel With Cone. Standard Porcelain Burner.	Consumpt of the Burner under Trial for 100 Litres of the Standard.	Observations.
Inches.	Cub. Ft.	Cub. Ft.		
1/24	4·2734	4·2734	100	Flagging flame.
do.	3·5316	3·6024	98	Good flame.

As a slit may be considered as formed by a series of holes very close together, results analogous to those that we have already mentioned should be arrived at by its investigation.

The following is an example of the numerous experiments made by means of a burner composed of a truncated cone capable of being moved by a screw in a cylinder, which surrounds it, so as to diminish or increase the diameter of the annular space which separates them, and by which the gas escapes. (Fig. 9.)

Fig. 9.

It will be seen, that large slits always present the same advantage; but, that towards the width of 1/25th of an inch the illuminating power diminishes, and the burner becomes unprofitable.

Width of the Slits.	Consumpts			Observations.
	Of the Burner with Slit.	Of the Standard Bengel.	Of the Burner under Trial for 100 Litres of the Standard.	
Inches.	Cub. Ft.	Cub. Ft.		
1/64	4·3793	3·2845	133	Blue flame.
1/55	4·2381	3·7083	114	
1/43	3·7790	3·2845	114	Good flame.
1/36	3·6377	3·3198	109	" "
1/31	3·8496	3·2492	117	
1/28	4·0614	3·4611	117	

Number of Holes. Although no precise experiments were made upon the influence of the number of holes, everything leads to the belief, that all other things being equal there is an advantage in increasing them. In fact, the Bengel burner, with 30 holes, constructed almost upon the same conditions as the Bengel burner of 20 holes, presents an advantage of more than 25 per cent. upon this latter with regard to the illuminating power. This result might be admitted *à priori*, as, for equal consumptions the gas flows less rapidly when the number of holes of the same diameter is greater. Besides, when the holes are very distant from each other, the sheets of gas no longer blend, and there is an admission of air between them, which tends to diminish the illuminating power as we shall hereafter demonstrate.

(*To be continued.*)

WEBSTER'S PROCESS FOR MAKING OXYGEN GAS.

By DUGALD CAMPBELL, Esq., F.C.S.

[From the *Chemical News.*]

I have made the following experiments, in order to examine into and report upon the process of Mr. James Webster, of Birmingham, for "manufacturing oxygen gas, and obtaining certain other products," described in the specification of his patent, No. 2607, dated Oct. 19, 1861.

The materials which I employed in my experiments were commercial nitrate of soda of the ordinary quality, and a common oxide of zinc; the first of value, I should say, at from £13 to £14 per ton, and the latter at from 30s. to 40s. per ton.

The mode of operating was as follows: 10 lbs. of the nitrate of soda and 20 lbs. of the oxide of zinc, both previously dried, were mixed roughly together, and thrown into a red-hot retort. In a minute or two, when the oxygen gas began to come off—which was ascertained by the gas having the power of supporting combustion—the gas was made to pass into what was named the purifier, which I shall afterwards describe, and from thence into a graduated gasometer.

When the gas had ceased to come off, the gasometer was shut off from the rest of the apparatus, and the contents of the retort, emptied into a tray, and mixed roughly with an additional 10 lbs. of dry nitrate of soda, were returned into the retort, and distilled as before; and, when no more gas was evolved, the gasometer was again shut off, and the contents of the retort discharged into a tray, and again mixed in a similar manner with 10 lbs. of the dry nitrate, and distilled as before.

The material in the retort has now become, to some degree, pasty, and is considered no longer fit to have more nitrate of soda added to it; and, from the original weight of 50 lbs., it is now reduced to 37 lbs., or has lost 13 lbs. It consists as follows:—

In 100 parts.

Sand with oxide of iron	13·66
Oxide of zinc	30·20
Anhydrous soda	24·80
Nitrite of soda with a little nitrate	31·34

It will be seen from the above, that this material contains 24·8 per cent. of anhydrous soda, which is equal to 32 per cent. of hydrate of soda; and, by boiling it in water, this hydrate of soda, together with the nitrate of soda, are dissolved out from the oxide of zinc, and may be readily separated from each other by crystallizing out the nitrate, leaving the hydrate.

But it sometimes happens that, from too great a heat being employed in obtaining the gas, or from the nature of the iron of the retort used, besides these salts of soda, a salt of iron and soda is formed—viz., the ferrate of soda. This salt is green, and is not separated by crystallization from the hydrate, and consequently would much contaminate it, and render it much less valuable. In my opinion, it is quite easy to avoid such an action taking place.

But, in the event of such an action having taken place, the use to which the residual product may be afterwards put in the process—viz., in the purifying of the gas as it passes through the purifiers—alters it, and converts it into a substance more readily to be dealt with.

The purifier, spoken of before, consists of a deep jar, at the bottom of which 5½ lbs. of water are placed. The gas from the retort is made to enter just above the water, and passes up through perforated trays, on which are spread the 37 lbs. of residual material from the retorts, broken into a rough powder, and moistened with 6 lbs. of water, making together 43 lbs.

In all my experiments, the residual material remained in the purifier during the distillation of the 50 lbs. of the material only, when it was removed and weighed.

The water at the bottom of the receiver is now strongly acid, with a mixture of nitrous and nitric acids, and has increased in weight in my experiments from 2 lbs. to 3½ lbs., depending upon the degree of heat used in the process. That being the case, its specific gravity is variable, and, in the course of one distillation of 50 lbs., the acid water is not of much value; but it might remain in the purifier during several charges, when it would become strong and of real value, or it might be drawn off, and added to the dry residual material removed from the trays after it has done purifying the gas.

This residual material upon the perforated trays in the purifier, after the passing of the gas from 50 lbs. weight of the materials, has increased in weight in my experiments from 2 lbs. to 3 lbs., according to the temperature at which the materials are distilled, and also according to the nature of the residual material employed in the purifier, and is now much changed, and the hydrate of soda is now almost totally converted into nitrate of soda, and any ferrate of soda is decomposed. Its composition is as follows:—

In 100 parts.

Water and sand	26·27
Carbonate of soda	5·00
Oxide of iron	6·00
Oxide of zinc	22·82
Nitrate of soda with a very little nitrite	39·91

The way which I would suggest of dealing with the above substance, is to add the acid water from the bottom of the purifier to it, so as to neutralize any carbonate of soda which it may contain, and boil it with water, which will dissolve the nitrate of soda from the insoluble oxide of zinc, and the solution of nitrate is afterwards evaporated for the nitrate.

The yield of gas from 20 lbs. of oxide of zinc and 30 lbs. of nitrate of soda in my experiments was very close, varying only from 157·85 to 159·03 cubic feet; and the time occupied in each working of 50 lbs. was, as near as may be, 9½ hours.

I was unable to fix exactly what the consumption of fuel was for one charge, but, from the data I obtained, I should say it was under 9d.

On analyzing the gas, I was surprised to find that it contained a considerable per centage of nitrogen, in my experiments varying from 26·50 to 32·80 per cent.; for, independently of its supporting combustion very well, and increasing the illuminating power of coal-gas to a great degree, I should not have expected nitrogen to be eliminated from the materials used, by the heat which was employed. However, finding the nitrogen there, it appears to me that it must have got there by using too high temperatures; * and I think, by experimenting at different temperatures, you may find out one where little, if any, will be produced—or one, at any rate, at which much less will be produced.†

SULPHUR IN GAS.

[From the *Social Science Review.*]

Some time since there was a great outcry respecting the gas supplied for public consumption. It was reported as deficient in illuminating power, and so imperfectly purified as to render its use, especially in small apartments, offensive, if not absolutely injurious. These reports were not wholly unfounded, but the grounds upon which they were urged were considerably exaggerated. It is perfectly true that the gas supplied in some districts did not give so powerful a light, neither was it so well purified as it is at the present time; but the fault lay with the consumers rather than with the gas companies, and was attributable chiefly to the old-fashioned laws of supply and demand. A gas-work, surrounded by a population willing to pay a good price, supplied, generally, a good article, whereas one in a poorer neighbourhood sent out an inferior gas at a lower price, to suit its customers. But whether a high or a low price was charged, it was so proportioned to the quality of the gas as to leave a profit to the shareholders in the gas companies; and, as every company was at liberty to fix both the quality and the price of the gas, there was great variety of price in different localities. The public, not understanding the difference in quality, could not understand the difference in price, and hence Parliament was appealed to, and an Act was passed, placing the claims, both of the gas companies

* Acting upon these suggestions, the proprietors have obtained a higher degree of purity in the gas, which they find to be improved also by the addition of more water to the materials in the purifier.

† The publication of the above report has given rise to the following correspondence in the columns of the *Chemical News*:—

"TO THE EDITOR OF THE 'CHEMICAL NEWS.'

"Sir,—In your journal of Nov. 29, Mr. Dugald Campbell describes an investigation he has made on heating nitrate of soda and oxide of zinc together, for the purpose of making oxygen, the results of which, I must confess, I do not understand.

"Twenty pounds of oxide of zinc are taken, and, at three different times, heated with 10 lbs. of nitrate of soda—making, in all, 50 lbs. of material—namely, 20 lbs. of oxide of zinc, and 30 lbs. of nitrate of soda.

"Mr. Campbell says the results of heating are, 37 lbs. left in the retort, and 158 cubic feet of gas in the gasholder.

"The residue in the retort consisted of—

'Sand, with oxide of iron!!!	13·66
Oxide of zinc	30·20
Anhydrous soda	24·80
Nitrate of soda, with a little nitrate	31·34, in 100 parts.'

"Reducing these proportions to 37 lbs., the quantity left in the retort, we get—

Sand, oxide of iron, and oxide of zinc.	16·2
Anhydrous soda	9·2
Nitrate of soda, with a little nitrate	11·6
Parts or lbs.	37·0

"Now, it will be found that the equivalents are, of—

9·2 anhydrous soda, = 24·7 nitrate of soda; and of
11·6 nitrate of soda, = 12·7 nitrate of soda—

Making, altogether, = 37·4 nitrate of soda from 30, to begin with.

This is a curious result, but nothing to what Mr. Campbell goes on to describe:

"The residue of the retort is now put into the condenser, which he explains in your journal, and the gas from a new charge of the retort is passed through it, by which the anhydrous soda and nitrate are converted into nitrate of soda, besides making 158 cubic feet of gas in the gasholder.

"What has this gas come from?

"He tells us it is oxygen and nitrogen; but how can it be so, when the nitrate of soda is nearly all recovered in the condenser?

"Perhaps, some of your readers, or Mr. Campbell himself, may enlighten me.

"AN INQUIRER."

"Sir,—Let me add a few words to the letter of 'Inquirer,' which appeared in last week's number of the *Chemical News*. Has Mr. Webster, or have Messrs. Pepper and Campbell ever tried the action of a regulated temperature upon a mixture of nitrate of soda with peroxide of iron, instead of oxide of zinc? The residual soda is not, in this case, contaminated with immense quantities of a metallic compound, the presence of which quite unfits the product for soap-makers use. I confess that I have been totally unable to discover any advantages in Webster's process; the prospectus of the company exhibits, indeed, a lamentable ignorance of the first principles of chemistry. One instance will suffice: The residue of the charge after each operation is recommended to be exposed to the air, that the zinc may recover its lost oxygen!!! I was not aware that deflagration with cubic nitre was deemed a process of *reduction*, or that, at the ordinary temperature, the atmosphere was a more highly oxidizing medium than Webster's oxygen mixture, at a low red heat. It is not a flattering estimate, to say the least, of the powers of this new process.

"ANOTHER INQUIRER."

"Sir,—I beg to remark, in answer to 'An Inquirer's' letter in your last paper, that, had he calculated the weight of the gas got by Dugald Campbell, Esq., he would have found the results perfectly correct: thus, 158 cubic feet of oxygen gas weighs 13 lbs., which, added to 37 lbs. of residue in the retort, is exactly 50 lbs. This shows how carefully the experiments must have been done, as the result could not have tallied more correctly with the quantity of material used, had it been calculated on purpose to agree. It is a voucher for the purity of the materials, and the truth of the experimentalist.

"A CHEMIST."

and the consumers, upon a definite basis. The quality of the gas was never to fall below a given standard in illuminating power, and, within certain limits, the maximum price of the gas was fixed at 4s. 6d. per 1000 feet: several restrictions were at the same time laid down, by which it was supposed the public would be still further protected, and the profits of the companies to some extent regulated. Since the passing of the Act, the gas has considerably improved, both in illuminating power and purity, and most of the companies supply a better gas than is required by the Act of Parliament. One condition, however, has arisen, which does not appear to have entered into the calculations of those who raised the agitation—the price of the gas has been increased, in many cases, 6d. per 1000 cubic feet. In the City of London great dissatisfaction was expressed at the rise in the price, and several indignation meetings were held to protest against it. Still, the proceedings of the gas companies were in conformity with the Act of Parliament, and the improved quality of the gas was promptly pointed out to the dissatisfied parties. That the gas possesses greater light-giving power, and that it is better purified, we readily admit; but we share the conviction of the public that the gas companies are benefited to a far greater extent than the consumers by the Act of Parliament; gas is evidently profitable to its manufacturers, or the shares would not command such fabulous prices in the market.

The point to which we would direct attention on the present occasion has reference to the purification of gas, rather than its price, and, in order to obtain definite notions on the subject, it will be necessary to take a cursory view of the composition of coal, and to trace its components through the various processes to which it is subjected in the manufacture of gas for illuminating purposes. Coal, it has long been established, is the remains of a vegetation which covered the earth in times far anterior to its adaptation to the life of man, the purest specimens being those which were formed by plants growing on the spot. The principal elements in common coal are carbon, hydrogen, oxygen, and nitrogen, in addition to which sulphur and earthy impurities are always met with in small quantities. Of these substances, carbon and hydrogen form by far the largest proportion in the composition of coal, generally exceeding 90 per cent. of its whole bulk, and they alone are useful in the manufacture of gas; the other elements are useless or injurious, and the more perfectly the gas is purified from them the greater is its utility and desirability as an illuminating agent.

Several varieties of coal are used for gas illumination, the value of the coal for this purpose being determined by the relative quantity and quality of the volatile matters disengaged from it at a red heat. Thus, Boghead cannel produces 15,000 cubic feet of gas per ton of coal, very pure, and of great illuminating power, whereas Blenkinsopp coal procuces less than 10,000 cubic feet of gas per ton, the illuminating power of which is considerably less than half of that produced from Boghead cannel coal. To obtain coal-gas, the coal is placed in retorts over furnaces maintained at a red heat. By this means, the volatile compounds are separated from the non-volatile, and an outlet-tube ascending from the retort conveys them into a larger tube, called the hydraulic main. Here the first step in the purification is accomplished. The end of the outlet-tube, which dips into the hydraulic main, is bent downwards, so as to dip to the extent of three or four inches in the water always contained in the hydraulic main. This simple mechanical contrivance is one of the most important agents in gas-making. By it the end of the tube is sealed, so as to prevent effectually the return of the gas during the charging of the retorts with the coal; and in the hydraulic main and in the "condensers," all the condensible products of the coal, such as water, tar, ammonia, and other impurities, are retained. Thus separated from condensible vapours, the gas, still more or less impure from the presence of carbonic acid and sulphuretted hydrogen, is passed on to the purifiers. The purifiers are vessels charged with lime or oxide of iron, and with these substances the impurities of the gas combine, while the gas itself, having no tendency to form compounds with lime or oxide of iron, is unaffected, and passes on to the gasometers, from whence it is distributed by large tubes.

Oxide of iron is now becoming the general agent for the purification of gas, on account of the property which it possesses of freeing itself, on exposure to the atmosphere, of the substances taken up from the gas; consequently, the same oxide of iron may be used an indefinite number of times for the same purpose. It must, notwithstanding, be confessed, that however economical to the gas companies, the process of "airing" the oxide of iron is by no means a pleasant one to the population in the vicinity of a gas-work: the stench evolved is almost unendurable; and brass fittings, silver watches, or a half-crown left in one's waistcoat pocket, become alike blackened by a deposit of sulphide. The purification of gas by lime involved perhaps even more unpleasantness. Lime can be used but once; hence arises a difficulty as to what shall be done with it after serving its purpose in a gas factory. Before the introduction of oxide of iron as a purifying agent, it was left to accumulate, under the title of "blue billy," to the infinite disgust of all who might have occasion to pass near it.

After all the processes of purification to which the gas is subjected, there still remains a small amount of impurity, the most obnoxious part of which is caused by the presence of a compound of sulphur, known to chemists as bisulphide of carbon. This substance, so far as our chemical knowledge extends at the present time, cannot be separated from the gas, as no agent is known which will absorb or decompose it on a large scale. Silversmiths are practically aware of the presence of a something in the gas which blackens their wares; hence, the precaution usually observed by them of lighting their shops, as far as possible, from the outside. But the public health was not so much endangered as many persons supposed, from the presence of a sulphur compound in the gas they were consuming. Experiments, conducted by practical chemists, have elucidated the fact, that the sulphur compounds exist in almost infinitesimal proportion in the gas now supplied for public use. We have before us the results of ten analyses of gas from different companies, in which it is stated that the sulphur present in gas as sulphide of carbon ranged from 2·99 grains to 9·41 grains in 100 cubic feet of gas: comparing by weight, 10,000 parts of gas contained respectively 1·2, 2·6, and 3·8 parts of sulphur: comparing by volume, 10,000 parts of gas contained respectively 0·236, 0·480, and 0·747 parts of bisulphide of carbon. Thus it will be seen that the amount of sulphur is so small that it is incapable of producing any injurious effects upon the human system.

One of the analysts, Mr. Versmann, a gentleman thoroughly acquainted with the chemistry of coal-gas, puts the case in a still clearer light. He took a number of common lucifer-matches, and by analysis found that many varieties of them have more than a grain of sulphur each. He then supposes that a large, lofty room is lighted with four gas-burners, each consuming 5 cubic feet of gas per hour, and that their flames burn for five hours in order to consume 100 cubic feet of gas, containing from 2·99 grains to 9·41 grains of sulphur. The same quantity of sulphur would be burned by lighting, during the five hours, from three to ten lucifers, and no one would entertain the least fear in so doing, although it is very possible that the phosphoric acid, simultaneously evolved, might be even greater in quantity than the sulphurous acid. Taking a particular case, it is remarked that four burners, each consuming 5 feet of gas per hour, will well light a room 16 × 16 × 20 feet, or containing 5120 cubic feet. It will take five hours to consume 100 cubic feet of gas; and, supposing this to contain the maximum amount of sulphur allowed by the Metropolis Gas Act—viz., 20 grains—although this is more than double the quantity found by actual experiment—a volume of 0·032 cubic feet of sulphurous acid would be spread through the 5120 cubic feet of air during the five hours. If no ventilation whatever were allowed, the atmosphere of such a room would be in its worst condition at the end of five hours, "when it will contain 0·000625 per cent. of sulphurous acid; or 160,000 cubic feet of air will contain one cubic foot of sulphurous acid." These remarks—the result of careful analysis—will help to satisfy even the most nervous that there is no serious ground for alarm respecting the small amount of sulphur unavoidably present in gas; a much larger proportion must exist in it before any injurious effects will be experienced. This is not all: the gas examiners in most districts report that its purity, as well as its power, has increased during the last few months.

There is, however, a danger connected with the consumption of gas, the remedy for which rests in the hands of the consumers. A poisonous gas is generated, and in large quantities, by the burning of gas; but it is not susceptible by our nasal organ, and hence its presence is seldom challenged. The gas which we burn is not what chemists would call a regular compound—it is a mixture of gases, the most important of which, both in quantity and for light-giving purposes, are heavy and light carburetted hydrogen. These gases are composed of hydrogen and carbon; and, on combustion, the hydrogen unites with the oxygen of the atmosphere to form water, while the carbon combines with more oxygen to form carbonic acid gas. This latter substance is that from which danger to health is most likely to arise—partly from the large amount of it produced, and partly from the fact that its presence is in general unnoticed. For every 100 cubic feet of gas consumed, rather more than 50 cubic feet of carbonic acid gas are produced; in addition to which, it should be borne in mind, this quantity is augmented by every expiration of the breath of every individual present. When found in large quantity, as is sometimes the case in brewers vats, the effects of this gas upon the human frame are instantly apparent; and many a poor fellow has lost his life for want of the usual precaution—that of letting down a lighted candle; but when the quantity in the atmosphere of a room is comparatively small, there is no monitor to mark its presence, although it may still be exercising a pernicious influence.

While, then, it would be desirable to remove all traces of sulphur from the gas consumed in our dwellings, we may rest satisfied that the quantity produced is not such as to cause any injury to our health. If we work in a small room, we require a small amount of gas—probably not so much as would produce in five hours sufficient sulphur for a couple of lucifers; whereas, in a larger room, with more burners, the sulphur evolved would be distributed over a larger space, and consequently its effects would be little felt. Carbonic acid cannot be got rid of in the combustion of gas; it is a product of all combustion, and the only way to counteract its effects is to supply a proper and sufficient ventilation to all rooms in which gas is consumed.

DR. J. NORTHCOTE VINEN'S REPORT ON THE GAS SUPPLIED BY THE SURREY CONSUMERS COMPANY:—

1862. Week ending.	Number of Observations.	Maximum Light. Candles.	Minimum Light. Candles.	Average Light. Candles.
Dec. 6	4	13·11	12·25	12·59
„ 13	4	13·88	12·62	13·29

The average volume of hydrocarbons was 3·75 per cent; of carbonic acid, 0·75 per cent. There was no sulphuretted hydrogen. Ammonia was present on two occasions. The maximum pressure was 23/10ths; the minimum, 5/10ths.

DR. HILLIER'S REPORT ON THE GAS SUPPLIED BY THE IMPERIAL GAS COMPANY IN ST. PANCRAS.—The illuminating power of the gas supplied during the month of November last was on all occasions above the parliamentary standard. The average was equal to 14 sperm candles; the maximum result was 15 candles; the minimum was 12·9 candles. Traces of ammonia were indicated on every occasion by turmeric test-paper; though, during the past three weeks, to a less amount than before. This amount is, however, contrary to the letter of the law. No traces of sulphuretted hydrogen were observed. The pressure was maintained very much as in former months.

BAHIA GAS-WORKS.—Mr. Hunter Jones, late of Northampton, has been appointed to the responsible post of acting engineer and manager of these works; and left for his destination by the Brazilian mail steamer, on the 9th inst.

FIRE AT A PETROLEUM OIL MANUFACTORY.—A destructive fire broke out on the premises of Messrs. Rossel and Co., petroleum oil-refiners, in Rotherhithe Street, on the night of Monday, the 1st instant, the origin of which has been traced to the leakage of one of the stills. The fire commenced in a brick building about 80 feet long by 40 feet wide, fitted up with costly machinery, and used as one of the oil-refineries, adjoining to which were a number of open yards and sheds filled with casks of petroleum. The building was burned out, and the machinery considerably damaged by fire; but, by the exertions of the fire-brigade, the flames were prevented from communicating to the adjoining premises. Neither the stock nor the plant was insured.

THE PARA GAS COMPANY.—A new undertaking has been organized under the title of the Para Gas Company, Limited. One of its peculiarities is, that the whole of the capital, which is £100,000, in £10 shares, has been privately subscribed for. No applications are, therefore, invited from the public. The project is framed by a number of persons of respectability, with a view to carry out a very liberal Government concession for lighting with gas the city of Belem, the capital of the province of Para, in Northern Brazil. A guaranteed contract for the construction of the works has been entered into with Messrs. Peto and Betts, and Messrs. Aird and Son. Arrangements have been made with Mr. Thomas Rumball, by which he undertakes the engineering expenses at a definite remuneration; and the transfer of the concession, including all preliminary expenses, up to the formation of the company, has been agreed upon for a fixed sum. The chairman is Sir William Clay, Bart.; and the other directors are—Sir C. H. J. Rich, Bart., and Messrs. John W. Clark, Henry Whiting, John S. Rivolta, Charles Aird, and Joseph Quick. It is stated that the prospectus will not be advertised.—*Daily News.*

FLINTOFF'S ACTION AGAINST THE "STIRLING OBSERVER."—This action, which has been pending nearly eighteen months in the Court of Session, was finally decided last week against the pursuer—the court pronouncing *absolviter* in our favour, with expenses. It will be recollected that Mr. George Flintoff delivered a lecture in Stirling, in the summer of last year, on the subject of "Cheap Gas;" and, because we ventured to call in question the lecturer's "facts and figures," he was foolish enough to raise an action for libel against us. When public lecturers—like Mr. Flintoff—are free and easy in their criticism of men and things, they should be thick enough in the skin to stand a little quiet scalping on the part of the public press; and, at the very least, never commit the folly of going to "law" like a petted, ill-natured child.—*Stirling Observer*, Dec. 4.

PIG IRON AND IRON ORE.—The total production of pig iron in the United Kingdom last year was estimated as follows:—

	Tons.
Northumberland	73,260
Durham	312,030
Yorkshire—North Riding	234,656
" West Riding	142,865
Lancashire	109,377
Cumberland	55,165
Derbyshire	129,715
Shropshire	140,791
North Staffordshire	187,700
South Staffordshire	395,650
Northamptonshire	7,730
Gloucestershire	23,163
Wiltshire and Somersetshire	17,330
North Wales	46,658
South Wales (anthracite production)	50,740
" (bituminous production)	835,560
Scotland	950,000
Total	3,712,390

Welsh pig iron realized on the average last year £3. 10s.; Scotch pig, £2. 9s. 7d.; Cleveland pig, £2. 17s.; and Staffordshire pig, £3. 11s. 3d. per ton. The market value of the production was, therefore, calculated to be £11,508,400. Northumberland had last year 7 out of 8 furnaces in blast; Durham, 32 out of 60; the North Riding of Yorkshire, 26 out of 33; the West Riding of Yorkshire, 27 out of 34; Lancashire, 10 out of 12; Cumberland, 8 out of 13; Derbyshire, 24 out of 37; Shropshire, 22 out of 31; North Staffordshire, 23 out of 32; South Staffordshire and Worcestershire, 114 out of 182; Northamptonshire, 3 out of 4; Gloucestershire, 3 out of 9; Wiltshire, 2 out of 4; and Somersetshire, 1 out of 2—making a total for England of 303 out of 471. In Derbyshire, 5 out of 12 furnaces were in blast; Glamorganshire, 9 out of 18 (anthracite), and 59 out of 78 (bituminous); Brecknockshire, 3 out of 7 (anthracite), and 10 out of 17 (bituminous); Carmarthenshire, 2 out of 4 (anthracite); Pembrokeshire, none out of 2; and Monmouthshire, 54 out of 74 (bituminous)—making a total for Wales of 142 out of 212. In Ayrshire, 35 out of 43 furnaces were in blast; in Lanarkshire, 75 out of 98; in Fifeshire, 4 out of 12; in Linlithgowshire, 4 out of 4; in Stirlingshire, 6 out of 7; in Clackmannanshire, none out of 3; and in Haddingtonshire and Argyleshire, none out of 2—making a total for Scotland of 124 out of 169. The average for the year is of course the basis of this calculation. Mr. Hunt, of the Mining Record Office, thus estimates the amount of the iron ore made available last year:—

	Quantity. Tons.		Value.
Cornwall	26,262	..	£8,372
Devonshire	5,399	..	2,159
Somersetshire	32,763	..	16,381
Gloucestershire	100,419	..	45,189
Wiltshire	55,779	..	26,493
Hampshire	4,007	..	1,706
Oxfordshire	5,600	..	2,100
Northamptonshire	113,139	..	28,534
Lincolnshire	33,559	..	13,403
Warwickshire	15,250	..	4,000
North Staffordshire	499,195	..	174,711
South Staffordshire	727,500	..	227,342
Shropshire	223,400	..	48,403
Derbyshire	396,520	..	99,130
Yorkshire—North Riding	1,130,760	..	169,368
" West Riding	235,500	..	58,875
Lancashire	519,180	..	259,500
Cumberland	472,195	..	259,680
Northumberland and Durham	10,750	..	3,000
North Wales	86,500	..	22,425
South Wales	542,705	..	172,287
Scotland	1,975,000	..	658,333
Ireland	165	..	66
Isle of Man	967	..	816
Total	7,215,518		£2,302,371

Ore, although scarce in the Isle of Man, would thus seem to be of extremely high quality.

Advertisements.

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PATENT DRY GAS-METERS,

STANDARD GASHOLDERS, AND TESTING APPARATUS.

The Sales of Gas Act has rendered a far higher degree of accuracy in Gas-Meters than that generally attained hitherto, indispensable.

This necessity Messrs. GEORGE GLOVER and Co., are prepared to meet, their PATENT DRY GAS-METER being made in accordance with the same high standard of accuracy, and the same conditions and principles as those adopted in the construction of the National Standard Gasholders.

The daily use of these standards at the Exchequer for eighteen months has fully justified the opinion expressed of them by the Astronomer-Royal, in his reports to the Lords Commissioners of Her Majesty's Treasury, as capable of "being applied to Gas Measures of every class, and Gas-Meters of every class, as accurate as it is possible for human skill to make them."

That opinion has been endorsed by the jury in Class X. of the International Exhibition (several of them being eminent in science and engineering), having awarded the fac-simile of the National Standard and the other Gas Apparatus. Messrs. GEORGE GLOVER and Co. exhibit there the only medal for instruments relating to gas measurement which has been awarded in the Class. The award is for "*ingenuity, completeness, and efficiency of apparatus for measuring gas, and for excellence of material and workmanship.*"

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PATENT SELF-ADJUSTING & COMPENSATING GAS-METERS,

Which, by a simple arrangement of machinery, maintain a constant, true Water-Line.
N.B.—The Patent can be applied to any existing Wet Gas-Meters.

Manufacturers of EXPERIMENT METERS, GOVERNORS, MINUTE-CLOCKS, PHOTOMETERS, &c., &c., similar to those used by Mr. King, of Liverpool; and other Patterns.

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Also, Manufacturers of LOWE'S PATENT MOTIVE-POWER METER, for situations where there is an inadequacy of pressure to supply the special requirements of certain consumers in low grounds during the day or night. Also,

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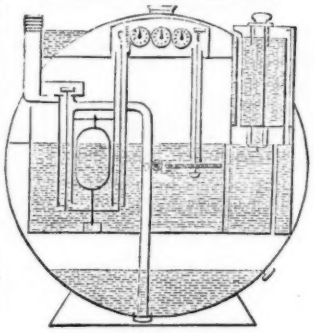

N. DEFRIES,

CONSULTING GAS ENGINEER,

Inventor and Patentee

OF

WET GAS-METERS,

WITH SELF-ADJUSTING WATER-LINE;

DRY METERS,

GAS-HEATING BATHS, OVENS, STOVES,

GAS FIRES with INDESTRUCTIBLE FUEL,

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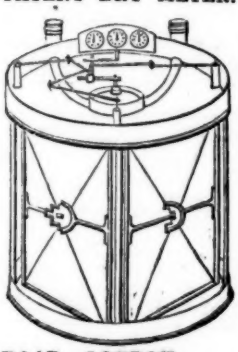

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Eight Doors from Factory.

Attempts having been made to construct Self-Supplying Apparatus to Wet Gas-Meters upon the Bird Fountain principle,—which, although unerring to supply water in the open atmosphere, has not wholly succeeded so as to be relied upon when enclosed in a Gas-tight Meter Case,—N. DEFRIES begs leave most respectfully to acquaint Gas Companies, and the Public in general, that he has constructed his PATENT WET GAS-METER upon a method entirely different, being founded on the well-known principle of the self-acting supply of the Oil Lamp, which has never been applied for the adjustment of the Meter Water-Line before, and which, by the admission of external air to a chamber sealed from Gas, will never fail to faithfully perform its required function. They are of the very best materials and workmanship, will stand more pressure than is required as the test for soundness by the New Act, are guaranteed to prevent surreptitious burning without detection, and will be kept in repair free of charge for seven years.

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of which more than 80,000 are in use in Palaces, Churches, Chapels, Royal Dockyards, Club Houses, Public Offices, and other Buildings throughout the Empire and Continent, which have done so much in checking surreptitious burning, and simplified the fitting up of Gas.

To remove any doubt of accuracy of measurement his Meter for 1500 lights, in use upwards of ten years at the Royal Italian Opera, until that Building was destroyed by Fire, was long afterwards dug out of the burnt ruins, then tested by the Chartered Gas Company in the presence of George Lowe, Esq., F.R.S., and other Chief Officers, and found inflexibly correct. Also, on the 9th of June, 1858, at the Western Gas-Works, his Meter for 150 lights, after considerable use, was doubted, and subjected to the most variable tests—from the full lighting to a single Jet—and in each case, as in other instances, accuracy was finely indicated.

As to durability, his two large Meters at the Thames Tunnel have been in use night and day for upwards of twelve years—one continuation of dark hours—subjected to the wear and tear of seventy-five years as compared with the ordinary business hours of using Gas above ground.

LORD REDESDALE'S SALE OF GAS BILL.

All Meters constructed by N. DEFRIES are guaranteed to pass the Provisions of the Standard.

No alteration has been necessary in the Meters he continues to supply to the Chartered, Imperial, City of London, Equitable, and other large Companies, his accustomed range of 1 per cent. over and under meeting all the desired requirements; whereas, by the New Act, a greater departure from accuracy—viz., 2 per cent. fast to 3 per cent. slow—is permitted.

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IRON MERCHANT,
31, BANKSIDE, LONDON, S.E.
Socket, Flange, Hot Water-pipes, and all Connexions; Retorts, Hydraulic Main, Lamp-Columns, &c.; and every description of Castings and Wrought-Iron-Work for Gas and Water-Works, Steam, and general purposes.
N.B.—All goods kept in stock, and supplied at manufacturers prices.
Superior Newcastle Cannel Coal, direct from the Collieries.
Estimates given, and orders by post punctually attended to the same day.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.
Manufactory for every description of Casting and Machinery for Gas Works and Water Works.
Warehouse in London for Cast-iron Pipes and Connections of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Office in London, Mr. E. M. PERKINS, 78, Lombard Street.

JOHN WALKER,
Manufacturer of Fire-Bricks, Chimney-Tops, Gas-Retorts, &c.
OAK FARM FIRE-CLAY AND BRICK WORKS.
KINGSWINFORD, NEAR DUDLEY.
N.B. A Quantity of Circular and D-Retorts always in Stock.

SAMUEL CUTLER, Gasholder
MAKER and CONTRACTOR
For Tanks, Roofs, Purifiers, Condensers, Erection and Alteration of Works and every description of GAS APPARATUS.
PROVIDENCE IRON WORKS,
MILL WALL, POPLAR, LONDON, E.
Main Laying and Gas-Works erected complete.

WEST and GREGSON, Gas-Meter
MANUFACTURERS, &c.
UNION STREET, OLDHAM.
Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide-Valves, &c. &c.
W. and G. would respectfully call the attention of Gas Engineers and Managers to their Station-meters, having made and erected the largest in use at the present time, two of which may be seen at the Stockport and Liverpool Gas Works, on application to the respective Engineers.

GEORGE CUTLER & CO.,
GAS ENGINEERS, &c.,
London Gasholder and Boiler Works,
8, WHARF, WENLOCK ROAD, CITY ROAD, N.,
LONDON.

Rye, Nov. 12, 1860.
Dear Sirs,—I consider it incumbent on me to acquaint you that the alterations recently made on the Rye Gas-Works—viz., the addition of a NEWLY-IMPROVED WASHER, and other work for the Purification of Gas, executed by the experienced workmen under your able supervision—are perfectly satisfactory to the Company, and the Gas is now as pure as it can be made.
I am, dear Sirs, your obedient servant,
CHARLES THOMAS, Superintendent,
Rye Gas-Works.
Messrs. Cutler and Co.

TO INVENTORS AND PATENTEES.
MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c., supplied gratuitously upon application to the advertiser, 42, Parliament Street, WESTMINSTER. [Office of the JOURNAL OF GAS LIGHTING, &c.]

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

JOHN ROGERSON and CO.,
NEWCASTLE-ON-TYNE & MIDDLESBRO'-ON-TEES.
Wrought and Cast Iron Pipes, Cast-Iron Retorts, and all kinds of Foundry Work necessary for Gas-Works. Fire-Bricks and Clay Retorts. Gas Coals of every description. Pig, Bar, and Plate Iron.
LONDON HOUSE:
12, ROYAL EXCHANGE BUILDINGS.

HARRIS and PEARSON,
PROPRIETORS OF
BEST CLASS-HOUSE POT AND CRUCIBLE CLAY.
MANUFACTURERS OF
FIRE BRICKS, GAS RETORTS, &C.
AMBLECOTE FIRE CLAY AND BRICK WORKS,
STOURBRIDGE.
Late in the occupation of I. and W. King. Originally J. Pidcock, Esq.
NB. A quantity of best Clay Retorts in stock, viz.—Circulars, 14 inches, 15 inches, 16 inches.
D's, 16×12, 15×14, 20×16, 16×18.

JAMES OAKES and CO.,
ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20, WHARF ROAD, CITY ROAD, LONDON,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.
CHARLES HORSLEY, Agent.

DUPLEX GOVERNOR, for Gas-EXHAUSTER ENGINES.
D. LANE'S PATENT.
This Governor combines great delicacy with remarkable certainty of action. A pressure of one-tenth of an inch of water, operating on a diaphragm of 3 inches diameter, is sufficient to work the Regulating-Valve of an Engine of any power.

TESTIMONIALS.
Borough Engineer's Office, Town Hall
Halifax, March 29, 1862.
Dear Sir,—I have much pleasure in bearing my testimony to the efficiency of your Duplex Governor for regulating the speed of Gas-Exhausters.
The Governor has been perfectly self-acting, and has never given us one moment's thought, trouble, or expense. The engine-man has only to weight the tappets to the required vacuum, and the pressure-register paper never shows a greater variation than three-tenths in the twenty-four hours.
I can very confidently recommend the adoption of it to engineers and managers of gas-works making 50 million feet a year and upwards.
I am, dear Sir, yours faithfully,
G. W. STEVENSON.
Denny Lane, Esq., Cork Gas-Works, Ireland.

Gas-Works, Cork, April 4, 1862.
Dear Sir,—Having for some time past had in use three of your newly-invented Regulators for governing the speed of Steam-Engines in connexion with Gas-Exhausters, I am glad that I am able to speak of this valuable machine in terms of the highest praise. I have had them applied, as you know, to high-pressure and condensing engines, with Beale's and also Anderson's Exhausters. In every case, this small and valuable instrument is thoroughly effective in regulating the speed of the Exhauster. No amount of care with the hand can equal its accuracy of action for the intended purpose.
Denny Lane, Esq. A. H. STILL, C.E.

An Illustrated Circular, explaining the operation of the Governor, can be obtained by application to D. LANE, 72, South Mall, CORK; and the Governor can be seen in London at the Offices of GEO. ANDERSON, Esq., C.E., 16, Adam Street, ADELPHI.

LESLIE'S PATENTS: Gas and Coke from common Coal, greatly increased in value.—60, Conduit Street, LONDON, W.

LESLIE'S PATENTS: Up to Forty Candle Gas.—60, Conduit Street, LONDON, W.

LESLIE'S PATENTS: Licenses for England, Scotland, and Ireland, the 86 Departments of France and Belgium.—60, Conduit Street, LONDON, W.

LESLIE'S PATENTS: The National Waste Heaps at Collieries UTILIZED for Gas purposes.—60, Conduit Street, LONDON, W.

WILLIAM RICHARDSON & SON,
Gas and Hydraulic Engineers, and General Ironfounders; Steam-Boiler and Gasholder Manufacturers.
Offices and Stores—41, Meriden Street, BIRMINGHAM.
Works—Tunnel Foundry, DUDLEY.

READY and MEYNELL,
BILSTON STREET WORKS,
WOLVERHAMPTON.
Manufacturers of Gas-Fittings of every description, Lamps and Chandeliers, Star and Sun-Lights, and Mediæval and other Church-Fittings to any design.

GEORGE BOWER,
GAS ENGINEER, MANUFACTURER, AND CONTRACTOR,
ST. NEOT'S, HUNTS.
References to between 100 and 200 Gas-Works Designed and Erected by the Advertiser.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

HENRY BALFOUR AND CO.,
ENGINEERS & IRONFOUNDERS.
DURIE FOUNDRY,
LEVEN, FIFE;
& 16, ADAM STREET, ADELPHI, LONDON, W.C.
Gas Engineers and Contractors for Gas and Water-Works; manufacturers of Steam Engines and Exhausters, Steam Boilers, Gasholders, Cast-Iron Tanks, Purifiers, Condensers, Iron Retorts, Gas and Water Pipes.
Plans, Specifications, and Estimate furnished for new, or for extensions and alterations on existing, Works.

ALFRED PENNY, Gas and CONSULTING ENGINEER,
WENLOCK IRON WORKS,
21 & 22, WHARF ROAD, CITY ROAD, LONDON.
Mr. PENNY having had a large experience in the construction, alteration, and management of Gas-Works, begs to inform the Directors of Gas Companies that he may be consulted on all matters appertaining thereto. He also manufactures Gasholders, Purifiers, and all the various apparatus used in Gas-Works, and keeps in stock Retorts and Mouthpieces, Socket-Pipes, Bends, Branches, T-pieces, &c. &c.
Plans, Specifications, and Estimates prepared.

INTERNATIONAL EXHIBITION,
1862. CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.
WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE,
MANUFACTURERS OF EVERY DESCRIPTION OF
FIRE-BRICKS, CLAY RETORTS
&c. &c.
RETORT MOUTHPIECES, BOLTS, NUTS, &c.

International Exhibition,
July 11, 1862.
Class X., No. 2259.
The Jurors have **AWARDED A MEDAL** to
JOSEPH CLIFF and SON,
Wortley, nr. Leeds,
For Excellence of Material and Manufacture of
FIRE-CLAY RETORTS FOR GAS.

International Exhibition,
July 11, 1862.
Class XXXV., No. 6841.
JOSEPH CLIFF and SON,
Wortley, nr. Leeds,
Are Awarded Honourable Mention for
STONEWARE DRAIN-PIPES
OF LARGE DIAMETER.

KING BROTHERS,

STOURBRIDGE FIRE-BRICK AND RETORT WORKS.

KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them FREE FROM CRACKS AND CORRECT IN FORM. By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

Retort Ovens, Fire-Bricks, Guards, Saddles, Rabbitted Burs, Flues, and Quarries, are all Manufactured of the same quality of Clay.

Every Retort and Brick is branded "King Brothers, Stourbridge."

R. LAIDLAW & SON,

GAS ENGINEERS, IRON & BRASS FOUNDERS,

Alliance Foundry, 147, East Milton Street, and Barrowfield Iron-Works,

GLASGOW;

AND AT SIMON SQUARE, EDINBURGH;

MANUFACTURERS OF

STATION & CONSUMERS METERS, ALL SIZES;

WROUGHT-IRON TUBES, FOR GAS, WATER, & STEAM; CAST-IRON RETORTS & PIPES;

HYDRAULIC MAINS, CONDENSERS, WASHERS, SCRUBBERS, PURIFIERS, & TANKS.

GASHOLDERS;

GOVERNORS, SLIDE-VALVES, &c.;

WROUGHT & CAST IRON ROOFS & HOUSES.

Contractors for Gas-Works of any Magnitude. *Plans, Specifications, and Estimates furnished.*

SOLE AGENT FOR THE SOUTH, SOUTH-EAST, AND SOUTH-WEST OF ENGLAND:—

J. E. DOWSON, 8, BANKSIDE, SOUTHWARK, LONDON, S.E.

TRUSS'S PATENT ELASTIC PIPE-JOINT,

FOR GAS AND WATER-MAINS, AND STEAM PIPING,

Is the only PERFECT joint that has ever been constructed, and supplies the long-felt desideratum, by allowing for the expansion and contraction of metals, and for oscillation and deflection, without impairing the joint. Gas Companies will effect an incalculable saving in adopting it, as compared with the present imperfect mode of jointing.

Drawings, Estimates, and every particular, furnished on application to

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LLOYD AND LLOYD

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS,

PLAIN, GALVANIZED, & ENAMELLED, for Gas, Steam, and Water, from ⅛ in. to 6 in. bore.

STOCKS TAPS, and DIES, GUN METAL GLAND-COCKS, WATER-GAUGES, &c.;

PATENT LAP-WELDED IRON TUBES,

For Locomotive and Marine Boilers, &c.

LONDON WAREHOUSE—No 66, QUEEN STREET, E.C.

FIRE-CLAY GAS RETORTS.

ESTABLISHED IN 1795.

JOSEPH CLIFF and SON,

WORTLEY FIRE-BRICK WORKS, near LEEDS,

Are Awarded the PRIZE MEDAL for Excellence of Material and Manufacture of Clay Retorts, July 11, 1862. Class X., No. 2259.

THESE RETORTS are unrivalled in excellence, being the BEST FINISHED INTERNALLY, and THE MOST CORRECT IN FORM, of any in the Kingdom. From the peculiar composition used in working up the face of the material, they are rendered unusually smooth, close, and FREE FROM SURFACE CRACKS, thus, in a great measure, preventing leakage and the adhesion of carbon to their interior surface.

To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.

THE WORKS ARE WELL SITUATED

For EXPORT from the Ports of LONDON, LIVERPOOL, HULL, MIDDLESBRO', HARTLEPOOL, and STOCKTON.

FIRE-BRICKS, LUMPS, GUARDS, TILES, AND CLAY OF THE SAME QUALITY.

M. P. NEWTON, London Agent, No. 4, Wharf, King's Cross Goods Station.

WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

A large stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all sizes kept in London at CHRISTIE & CO.—Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

WILLIAM RICHARDS,

SOLE INVENTOR AND FIRST MANUFACTURER

OF THE

DRY GAS-METER,

Which obtained Prizes at the Exhibitions of London, 1851; New York, 1853; Paris, 1855; and three Prizes at the present Exhibition of 1862.

CRAWFORD PASSAGE, COPPICE ROW, CLERKENWELL, LONDON.

W. RICHARDS invites the attention of Gas Companies and Engineers to the Dry Meter manufactured by him, as possessing advantages over others, by his method of disposing of the flexible material, so that collapsing or bagging of the same is avoided. This defect, so conspicuous in some of the meters of other makers shown at the Exhibition, causes the measurement of the instrument to vary under different circumstances, and the durability of the same is materially impaired.

In the meters manufactured by W. Richards, all the metals of the working parts are incorrodible; the flexible material, the best that can be employed; and, in general construction, they are not to be surpassed.

To those who prefer the Wet Meter, W. Richards submits his patented improvements in the same, which consist n contracting the measuring-wheel at, and near, the water-line—thus allowing of a longer range for the float, and avoiding the sudden extinctions now so common; also, a simple remedy is applied to prevent fraudulent consumption, which the operation of the Sales of Gas Act has so much facilitated.

TELL-TALE EXHAUST AND PRESSURE-INDICATORS;

GOVERNORS, STATION-METERS, &c.

WILLIAM SUGG,

MANUFACTURER OF

PATENT DRY AND WATER GAS-METERS, TEST GASHOLDERS, AND APPARATUS,

"EVANS'S" PHOTOMETERS,

Experimental Meters, Minute Clocks, &c., Station-Meters and Governors,

STREET-LAMP GOVERNORS AND LAVA BURNERS,

19 and 20, MARSHAM STREET, WESTMINSTER.

INTERNATIONAL EXHIBITION, 1862.

TWO PRIZE MEDALS.

Class 13, No. 2973.

PHOTOMETERS, &c.,

Jury Award: PRIZE MEDAL,

For "Photometric Apparatus—for a well-constructed Apparatus to determine the Illuminating Power of Coal-Gas."

(PHILOSOPHICAL INSTRUMENTS, *North Gallery.*)

Class 31, Section B, No. 6350.

METERS, GOVERNORS, &c.,

Jury Award: PRIZE MEDAL,

For "General Excellence of Workmanship, and for his Improvements in Gas-Burners and Photometrical Apparatus."

(*Opposite* AMERICAN DEPARTMENT.)

LIVESEY FIRE-CLAY WORKS,
NEAR BLACKBURN, LANCASHIRE.

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,
AND EVERY DESCRIPTION OF
TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.
FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

INTERNATIONAL EXHIBITION, 1862.
Class X. No. 2265.
THE JURORS HAVE AWARDED TO
JOSEPH COWEN & CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,
THE PRIZE MEDAL FOR "GAS RETORTS, FIRE-BRICKS, &c., FOR
EXCELLENCE OF QUALITY."
JOSEPH COWEN & CO. were the only parties to whom a Prize Medal was awarded in the Great Exhibition of 1851 for
"GAS RETORTS AND OTHER OBJECTS IN FIRE-CLAY."

SERVIER'S
PATENT
SELF-ACTING GAS GOVERNOR.
This Instrument, which is designed to replace the ordinary Governor,
Operates solely by the Action of the Gas, without any Alteration of Weights, or the Assistance of any intermediate Agency or Apparatus whatever;
And it will maintain a Constantly Uniform Pressure in Gas-Distributing Mains, at any given point of their circuit.

All Applications for Licences to Manufacture or to Use the Apparatus to be made to
Mr. W. H. BENNETT, 42, Parliament Street, Westminster.

WILLIAM & BENJAMIN COWAN,
PATENT WET & DRY GAS-METER MANUFACTURERS,
Buccleuch Street Works, Edinburgh, & 13, Strutt Street, Manchester.
Established 1827.

SOLE MANUFACTURERS OF
ESSON'S PATENT COMPENSATING GAS-METERS;
KAY'S PATENT HYDRAULIC VALVE GAS-METERS;
Also, DRY METERS OF THE MOST APPROVED DESCRIPTION;
All of the above being Stamped under the Provisions of the SALE OF GAS ACT.
W. and B. C. likewise supply ESSON'S PATENT COMPENSATING FOUNTAINS, and KAY'S PATENT HYDRAULIC VALVES, now so extensively used for bringing ordinary Meters within the requirements of the Act of Parliament. Gas Companies can, therefore, either attach the FOUNTAINS or VALVES to their old Meters themselves, or forward them to W. and B. C. for Alteration and Stamping.

GOVERNORS, STATION-METERS, PRESSURE-REGISTERS & GAUGES,
MINUTE-CLOCKS, PHOTOMETERS, EXPERIMENTAL METERS,
AND ALL OTHER DESCRIPTIONS OF GAS APPARATUS.

INTERNATIONAL EXHIBITION,
Class 31 (Sub-Class B), No. 6288.

International Exhibition, 1862.

MESSRS.

CROLL, RAIT, AND CO.,

Manufacturers of Croll's Patent Improved

DRY GAS-METER,

Exhibited in Class XXXI. (B),

Have obtained the Medal for

"GOOD CONSTRUCTION AND SOUND WORKMANSHIP."

FACTORY:

CANAL BRIDGE, KINGSLAND ROAD, LONDON, N.E.

ALEXANDER WRIGHT,

55 and 55A, MILLBANK STREET, WESTMINSTER, S. W.,

MANUFACTURER OF

CONSUMERS' COMPENSATING & NON-COMPENSATING WET GAS-METERS,

Of the best material and workmanship, carefully adjusted to meet the requirements of the SALES OF GAS ACT.

STATION-METERS & GOVERNORS,

WRIGHT'S REGISTERING PRESSURE-GAUGE, EXHAUSTER REGISTER, & REGULATOR;

STANDARD TEST GASHOLDERS;

Consumers' Governors; Inspectors' Pocket, King's, and all other kinds of Pressure-Gauges; Thermometers for Condensers, Pressure Registers, &c., &c.

EXPERIMENTAL TESTING APPARATUS,

Employed by the best experimenters in this country and on the continent, and by the Gas Testers in the London districts.

PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, BI-SULPHURET OF CARBON TEST, THOMPSON'S BROMINE AND HEATING POWER OF FUEL TESTS, IMPROVED ALKALIMETER, EXPERIMENTAL METERS AND GOVERNORS, MINUTE CLOCKS, &c., &c.

"Analysis of Gas for Practical Men," new and enlarged edition, with "Gas-Meter Testing under Sales of Gas Act," p.p. 25 Stamps.

JAMES MEACOCK,

PATENT DRY AND WET GAS-METER MANUFACTURER,

7, SNOW HILL, AND 16, WEST STREET, LONDON.

ESTABLISHED 1836.

J. M. invites attention to his Improvements in EXPERIMENTAL WET GAS-METERS, by which he renders impossible any Leakage from the Stuffing-Box.

These METERS are GUARANTEED to meet all the Requirements of the SALE OF GAS ACT

GOVERNORS, STATION-METERS, PHOTOMETERS,

EXPERIMENTAL TESTING GASHOLDERS, HIGH-PRESSURE GAUGES,

AND ALL APPARATUS IN USE AT THE GAS MANUFACTORY.

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,

invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.

MANUFACTURERS OF

GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;

DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.;

IMPROVED FULL-WAY CARTER'S VALVES (much approved of);

GAS-STOVES, and every article connected with Gas Apparatus.

CAST & WROUGHT-IRON PIPE BLACK & GALVANIZED. COPPER, TIN, BRASS, & COMPOSITION TUBING.

D. HULETT'S IMPROVED SERVICE CLEANSER

for clearing out Mains, Services, and Interior Fittings—60s. net.

Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.

Sole Manufacturers of Church and Mann's Photometer.

Large Pattern Books, with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.

London: Printed by WILLIAM BOVEWTON KING (at the Office of Clayton and Co., 17, Bouverie Street, Fleet Street) and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, December 16, 1862.